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(54) Title: PROCESS FOR THE PRODUCTION OF FINE CHEMICALS

(57) Abstract: The present invention relates to a process for the production of the fine chemical in a microorganism, a plant cell, a plant, a plant tissue or in one or more parts thereof. The invention furthermore relates to nucleic acid molecules, polypeptides, nucleic acid constructs, vectors, antisense molecules, antibodies, host cells, plant tissue, propagation material, harvested material, plants, microorganisms as well as agricultural compositions and their use.

Process for the production of fine chemicals

[0001.0.0.0] The present invention relates to a process for the production of the fine chemical in a microorganism, a plant cell, a plant, a plant tissue or in one or more parts thereof. The invention furthermore relates to nucleic acid molecules, polypeptides, nucleic acid constructs, vectors, antisense molecules, antibodies, host cells, plant tissue, propagation material, harvested material, plants, microorganisms as well as agricultural compositions and to their use.

[0002.0.0.0] Certain products and by-products of naturally-occurring metabolic processes in cells have utility in a wide array of industries, including, but not limited to, the food, feed, cosmetics, and pharmaceutical industries and agriculture. These molecules, collectively termed 'fine chemicals' include molecules such as vitamins for example vitamin A, D, E, K, B₁, B₂, B₆, B₁₂, C, pantothenic acid, biotin or folic acid; substances with vitamin-like character for example vitamin F, lipoic acid, ubiquinones, choline, myo-inositol, vitamin U (S-methylmethionine), flavours for example vanillin, coumarin, isoeugenol, eugenol, (R)-carvone, (S)-carvone, menthol, jasmone or farnesol; nutraceuticals for example phytosterols, flavonoids, anthocyanidins, isoflavones or isoprenoids; detergents; fatty acids such as saturated fatty acids, mono unsaturated fatty acids (singular MUFA, plural MUFAS), poly unsaturated fatty acids (singular PUFA, plural PUFAS), waxes or lipids containing said fatty acids; carbohydrates for example cellulose, starch, dextrin, pectin, xanthan gum, carrageenan or alginate; sugars for example monosaccharides such as glucose, fructose, manose, sorbose, ribose, ribulose, xylose, xylulose or galactose, disaccharides such as lactose, sucrose, saccharose, maltose, isomaltose or cellobiose, trisaccharides such as raffinose or maltotriose; carboxylic acids for example citric acid, α -ketoglutaric acid, ferulic acid, sinapic acid or lactic acid; carotenoids for example α -carotene, β -carotene, zeaxanthine, lutein, astaxanthine, lycopene, phytoene or phytofluene, amino acids for example lysine, threonine, methionine, tryptophane, phenylalanine or tyrosine, cofactors for example heme or quinines, enzymes for example lipases, esterases, proteases, amylases, glucosidases etc. and other compounds [as described e.g. in Kuninaka, A. (1996) Nucleotides and related compounds, p. 561-612, in Biotechnology vol. 6, Rehm et al., eds. VCH: Weinheim, in Industrial Microbiology and Biotechnology, Demain et al., second edition, ASM Press Washington, D.C. 1999, in Ullmann's Encyclopedia of Industrial Chemistry, vol. A27, Vitamins, p. 443-613 (1996) VCH: Weinheim and Ong, A.S., Niki, E. & Packer, L. (1995) Nutrition, Lipids, Health, and Disease Proceedings of the UNESCO/Confederation of Scientific and Technological Associations in Malaysia, and the Society for Free Radical Research, Asia, held Sept. 1-3, 1994 at Penang, Malaysia, AOCS Press, (1995)], enzymes, and all other chemicals described in Gutcho (1983) Chemicals by Fermentation, Noyes Data Corporation, ISBN: 0818805086 and references contained therein]. Carotenoids are added for example to soft drinks, margarines or to animal feed for example to colour egg yolk or the flesh of fish. In the food industry polycarbohydrates are widely used as thickener. Polyunsaturated fatty acids are added for example to infant formulas to create a higher nutrition value of such formulas. PUFAs have for example a positive influence on the cholesterol level of the blood in humans and therefore are useful in the

protection of heart diseases. Fine chemicals for example PUFAS can be isolated from animal sources such as for example fish or produced with microorganisms through the large-scale culture of microorganisms developed to produce and accumulate or secrete large quantities of one or more desired molecules.

- 5 **[0003.0.0.0]** In large scale fine chemicals are produced with microorganism in the fermentation industry, which is responsible for the manufacturing of at least five major ingredient categories: antibiotics, organic acids, amino acids, enzymes, vitamins and other related products. There are production facilities in all important areas of the world especially in Europe, the US and Asia. Companies continuously try to optimize the
- 10 production processes, the organisms and thereby increasing the efficiency but, as in the case of amino acids and organic acids, with already high conversion rates based on feeded carbon source, the limitations of such work become evident. All fermentation processes depend on the efficient utilization of carbohydrates, supplied mainly in the form of oils, glucose or molasses. It is therefore the availability and pricing of these raw
- 15 materials that influence the competitiveness of fermentation products versus production for example in plants. Amino acids, organic acids and vitamins are offered at very low prices. For such products the question is whether it is still economical to continue fermentation production in future. And that is frequently a question of comparing the availability and pricing of carbohydrates with the future markets.
- 20 **[0004.0.0.0]** Particularly useful organisms for the production of fine chemicals are microorganisms such as the algae, fungi, bacteria or plants. Through strain selection, a number of mutant strains of microorganisms have been developed which produce an array of desirable compounds including vitamins, amino acids, PUFAs etc. However, selection of strains improved for the production of a particular molecule is a time-
- 25 consuming and difficult process.
- [0005.0.0.0]** Alternatively the production of fine chemicals can be most conveniently performed via the large scale production of plants developed to produce for example carotinoids, carbohydrates or PUFAS. For example for the production of carotinoids plants such as marigold are used. Particularly well-suited plants for this purpose are
- 30 sugar producing plants such as sugar beet or sugar cane or oilseed plants containing high amounts of lipid compounds such as rapeseed, canola, linseed, soybean, sunflower, borage and evening primrose. But also other crop plants containing sugars, oils or lipids and fatty acids are well suited as mentioned in the detailed description of this invention. Through conventional breeding, a number of mutant plants have been
- 35 developed which produce an array of desirable lipids and fatty acids, cofactors and enzymes. However, selection of new plant cultivars improved for the production of a particular molecule is a time-consuming and difficult process or even impossible if the compound does not naturally occur in the respective plant as for example in the case of C₂₀ and higher C-carbon chain polyunsaturated fatty acids.
- 40 **[0006.0.0.0]** Carbohydrates are an important dietary nutrient, which is mostly used to supply energy to the body, as well as, a carbon source for synthesis of other compounds such as fats or proteins. Furthermore mono- and disaccharides are widely used in the food and feed industry as sweetener. Saccharides have varying degrees of

sweetness on a relative scale. Fructose is the sweetest. For example in the United States 22 million tons of sugar and other sweeteners were consumed in 1999. Said natural sweetener consumption includes the consumption of sugar, corn sweeteners such as high fructose corn syrup as main product and others such as honey or maple syrup. All natural sugar based sweeteners have a market share of around 36 to 40 percent.

[0007.0.0.0] Whether unsaturated or saturated fatty acids are preferred in the food and feed industry depends on the intended purpose; thus, for example, lipids with unsaturated fatty acids, specifically polyunsaturated fatty acids, are preferred in human nutrition since they have a positive effect on the cholesterol level in the blood and thus on the possibility of heart disease. They are used in a variety of dietetic foodstuffs or medicaments. In addition PUFAs are commonly used in food, feed and in the cosmetic industry. Poly unsaturated ω -3- and/or ω -6-fatty acids are an important part of animal feed and human food. Because of the common composition of human food poly unsaturated ω -3-fatty acids, which are an essential component of fish oil, should be added to the food to increase the nutritional value of the food; thus, for example, poly unsaturated fatty acids such as docosahexaenoic acid or eicosapentaenoic acid are added as mentioned above to infant formula to increase its nutritional value.

[0008.0.0.0] Vitamins such as vitamin C, vitamin B12 or vitamin B2 are typically produced with microorganism as mentioned above in the fermentation industry. Vitamin C can be produced generally in a combined process using biotransformation steps in combination with classical chemical synthesis. In another production process vitamin C is produced by fermentation alone. In general organisms such as *Arthrobacter*, *Gluconobacter*, *Corynebacterium*, *Brevibacterium* or *Erwinia* are used for vitamin C production. Vitamin B2 and vitamin B12 are produced with organisms such as *Bacillus*, *Streptomyces*, *Citrobacter*, *Klebsiella*, *Propionibacterium* or *Ashbya* in large scale fermentation.

[0009.0.0.0] Commonly vitamin E and A are produced in a classical chemical process or isolated from as natural vitamin E from plant oils. Vitamin E is an important natural fat-soluble antioxidants. As such, vitamin E protects cell membranes from the damage caused by free radicals. High doses of vitamin E have also been linked to a decreased ability of the blood to clot, which may be beneficial in those individuals at risk for heart disease by reducing the risk of heart attack. A vitamin E deficiency leads to pathophysiological situations in humans and animals. Of the different types of vitamin E, the alpha tocopherol form is typically considered the "gold standard" in terms of antioxidant activity - although the most recent research suggests that the other chemical forms may possess equivalent or superior antioxidant protection. Vitamin E compounds therefore are of high economical value as additives in the food and feed sectors, in pharmaceutical formulations and in cosmetic applications. Vitamin A is another fat-soluble vitamin that is part of a family of compounds including retinol, retinal and beta-carotene. Beta-carotene is also known as pro-vitamin A because it can be converted into vitamin A when additional levels are required. Vitamin A is needed by all of the body's tissues for general growth and repair processes and is especially important for bone formation, healthy skin/hair, night vision and function of the immune

system. Vitamin A may help boost immune system function and resistance to infection. Vitamin A derivatives are widely used in cosmetics and dermatological treatments for skin preparations designed to combat skin aging and treat acne. Vitamin A has been used for decades as a treatment for various vision-related conditions, including night blindness, cataracts, conjunctivitis, retinopathy and macular degeneration.

[0010.0.0.0] An economical method for producing of vitamins such as vitamin C, B2, B12 or vitamin E and food- and feedstuffs with increased vitamin content are therefore very important. Particularly economical methods are biotechnological methods utilizing vitamin-producing organisms, which are either natural or optimized by genetic modification.

[0011.0.0.0] Carotenoids are a large family of compounds including over 600 members such as β -carotene, lycopene or lutein. Carotenoids are widely distributed in fruits and vegetables and are responsible, along with flavonoids, for contributing the color to many plants (a rule of thumb is the brighter, the better). In terms of nutrition, β -carotene's primary role is as mentioned above a precursor to vitamin A. β -carotene as most other carotenoids, is a powerful antioxidant – so it has been recommended to protect against a variety of diseases such as cancer, cataracts and heart disease.

[0012.0.0.0] The introduction of a new gene or new genes for the synthesis of fine chemicals into an organism or cell may not just increase the biosynthetic flux towards an end product it may also increase or create de novo a new compound composition. Similarly, other genes involved in the import of nutrients necessary for the biosynthesis of one or more fine chemicals (e.g., fatty acids, polar and neutral lipids, vitamins, enzymes etc.) may be increased in number or activity such that these precursors, cofactors, or intermediate compounds are increased in concentration within the cell or within the storing compartment thus increasing further the capability of the cell to produce the fine chemical as described herein.

[0013.0.0.0] Amino acids are used in many branches of industry, including the food, animal feed, cosmetics, pharmaceutical and chemical industries. Amino acids such as D,L-methionine, L-lysine or L-threonine are used in the animal feed industry. The essential amino acids valine, leucine, isoleucine, lysine, threonine, methionine, tyrosine, phenylalanine and tryptophan are particularly important for the nutrition of mammals especially humans and a number of livestock species. Glycine, L-methionine and tryptophan are all used in the pharmaceutical industry. Glutamine, valine, leucine, isoleucine, histidine, arginine, proline, serine and alanine are used in the pharmaceutical and cosmetics industries. Threonine, tryptophan and D,L-methionine are widely used feed additives (Leuchtenberger, W. (1996) Amino acids - technical production and use, pp. 466-502 in Rehm et al., (Ed.) Biotechnology vol. 6, chapter 14a, VCH Weinheim). Moreover, amino acids are suitable for the chemical industry as precursors for the synthesis of synthetic amino acids and proteins, such as N-acetylcysteine, S-carboxymethyl-L-cysteine, (S)-5-hydroxytryptophan and other substances described in Ullmann's Encyclopedia of Industrial Chemistry, vol. A2, pp. 57-97, VCH Weinheim, 1985. To prevent physiological malnutritions the human body

has a need for essential amino acids such as arginine, histidine, isoleucine, leucine, lysine, methionine, tyrosine, phenylalanine, threonine, tryptophan, and valine. Based on their content of amino acids, foods are often classified as complete, partially complete, or incomplete protein sources. In order for a protein to be complete, it must contain all of the essential amino acids. This is the reason that many nutritionists rank non-meat foods as being incomplete. The foods do contain all amino acids, but some may be in lower proportions than are required, and, therefore, should be combined with another food containing higher amounts of these amino acids or should be supplemented with said essential amino acids.

10... [0014.0.0.0] Over one million tonnes of amino acids are currently produced annually; their market value amounts to over 2.5 billion US dollars. They are currently produced by four competing processes: Extraction from protein hydrolysates, for example L-cystine, L-leucine or L-tyrosine, chemical synthesis, for example of D,L-methionine, conversion of chemical precursors in an enzyme or cell reactor, for example L-phenylalanine, and fermentative production by growing, on an industrial scale, bacteria which have been developed to produce and secrete large amounts of the desired molecule in question. An organism, which is particularly suitable for this purpose is *Corynebacterium glutamicum*, which is used for example for the production of L-lysine or L-glutamic acid. Other amino acids which are produced by fermentation are, for example, L-threonine, L-tryptophan, L-aspartic acid and L-phenylalanine.

[0015.0.0.0] The biosynthesis of the natural amino acids in organisms capable of producing them, for example bacteria, has been characterized thoroughly; for a review of the bacterial amino acid biosynthesis and its regulation, see Umbarger, H.E. (1978) *Ann. Rev. Biochem.* 47: 533 – 606].

25 [0016.0.0.0] It is known that amino acids are produced by fermentation of strains of coryneform bacteria, in particular *Corynebacterium glutamicum*. Due to their great importance, the production processes are constantly being improved. Process improvements can relate to measures regarding technical aspects of the fermentation, such as, for example, stirring and oxygen supply, or the nutrient media composition, such as, for example, the sugar concentration during fermentation, or to the work-up to give the product, for example by ion exchange chromatography, or to the intrinsic performance properties of the microorganism itself. Bacteria from other genera such as *Escherichia* or *Bacillus* are also used for the production of amino acids. A number of mutant strains, which produce an assortment of desirable compounds from the group of the sulfur-containing fine chemicals have been developed via strain selection. The performance properties of said microorganisms are improved with respect to the production of a particular molecule by applying methods of mutagenesis, selection and mutant selection. Methods for the production of methionine have also been developed. In this manner, strains are obtained which are, for example, resistant to antimetabolites, such as, for example, the methionine analogues α -methylmethionine,

ethionine, norleucine, N-acetylnorleucine, S-trifluoromethylhomocysteine, 2-amino-5-heprenoitic acid, selenomethionine, methionine sulfoximine, methoxine, 1-aminocyclopentanecarboxylic acid or which are auxotrophic for metabolites with regulatory importance and which produce sulfur-containing fine chemicals such as, for example, L-methionine. However, such processes developed for the production of methionine have the disadvantage that their yields are too low for being economically exploitable and that they are therefore not yet competitive with regard to chemical synthesis.

[0017.0.0.0] Zeh (Plant Physiol., Vol. 127, 2001: 792-802) describes increasing the methionine content in potato plants by inhibiting threonine synthase by what is known as antisense technology. This leads to a reduced threonine synthase activity without the threonine content in the plant being reduced. This technology is highly complex; the enzymatic activity must be inhibited in a very differentiated manner since otherwise auxotrophism for the amino acid occurs and the plant will no longer grow.

[0018.0.0.0] US 5,589,616 teaches the production of higher amounts of amino acids in plants by overexpressing a monocot storage protein in dicots. WO 96/38574, WO 97/07665, WO 97/28247, US 4,886,878, US 5,082,993 and US 5,670,635 are following this approach. That means in all the aforementioned intellectual property rights different proteins or polypeptides are expressed in plants. Said proteins or polypeptides should function as amino acid sinks. Other methods for increasing amino acids such as lysine are disclosed in WO 95/15392, WO 96/38574, WO 89/11789 or WO 93/19190. In this cases speziell enzymes in the amino acid biosynthetic pathway such as the diphydrodipicolinic acid synthase are deregulated. This leads to an increase in the production of lysine in the different plants. Another approach to increase the level of amino acids in plants is disclosed in EP-A-0 271 408. EP-A-0 271 408 teaches the mutagenensis of plant and selection afterwards with inhibitors of certain enzymes of amino acid biosynthetic pathway.

[0019.0.0.0] Methods of recombinant DNA technology have also been used for some years to improve Corynebacterium strains producing L-amino acids by amplifying individual amino acid biosynthesis genes and investigating the effect on amino acid production.

[0020.0.0.0] As described above, the essential amino acids are necessary for humans and many mammals, for example for livestock. L-methionine is important as methyl group donor for the biosynthesis of, for example, choline, creatine, adrenaline, bases and RNA and DNA, histidine, and for the transmethylation following the formation of S-adenosylmethionine or as a sulfhydryl group donor for the formation of cysteine. Moreover, L-methionine appears to have a positive effect in depression.

[0021.0.0.0] Improving the quality of foodstuffs and animal feeds is an important task of the food-and-feed industry. This is necessary since, for example, certain amino acids, which occur in plants are limited with regard to the supply of mammals. Especially advantageous for the quality of foodstuffs and animal feeds is as balanced as possible an amino acid profile since a great excess of an amino acid above a specific concentration in the food has no further positive effect on the utilization of the food since other amino acids suddenly become limiting. A further increase in quality is only possible via addition of further amino acids, which are limiting under these conditions. The targeted addition of the limiting amino acid in the form of synthetic products must be carried out with extreme caution in order to avoid amino acid imbalance. For example, the addition of an essential amino acid stimulates protein digestion, which may cause deficiency situations for the second or third limiting amino acid, in particular. In feeding experiments, for example casein feeding experiments, the additional provision of methionine, which is limiting in casein, has revealed the fatty degeneration of liver, which could only be alleviated after the additional provision of tryptophan.

[0022.0.0.0] To ensure a high quality of foods and animal feeds, it is therefore necessary to add fine chemicals that means a plurality of compounds such as amino acids, vitamins, organic acids, PUFAS etc. in a balanced manner to suit the organism. Such supplemented food is named as "functional foods" or "nutraceuticals". Nutraceuticals shall provide a health benefit to humans beyond basic nutrition. Functional foods have health-promoting or disease-preventing effects. Examples include omega-3 fatty acids (found in many fish, flaxseed oil, soybean oil, canola oil, and walnuts), which reduce risk of coronary heart disease and lycopene in tomatoes, which has been associated with reduced risk of certain cancers.

[0023.0.0.0] From a practical standpoint it would be of great advantage to produce an organism such as a microorganism or a plant containing a combination of different fine chemicals such as amino acids, vitamins, organic acids, carotenoids, PUFAS etc. at the same time in an sufficient amount to provide optimal growth and health benefit to animals or humans instead of combining different food or supplementing food or feed with different fine chemicals.

[0024.0.0.0] It is therefore an object of the present invention to develop an inexpensive process for the synthesis of a combination of fine chemicals such as amino acids like tryptophane, proline, arginine, phenylalanine, tyrosine, alanine, glycine, threonine, serine, valine, isoleucine or leucine especially essential amino acids such as tryptophane, arginine, phenylalanine, tyrosine, threonine, valine, isoleucine or leucine, carbohydrates such as raffinose, maltose or inositol, vitamins such as γ -, α - or β -tocopherol, organic acids such as ferulic acid, malate or sinapic acid, carotenoids such as β -carotene etc. at the same time in an sufficient amount to provide optimal growth and health benefit to animals or humans

[0025.0.0.0] It was now found that this object is achieved by providing the process according to the invention described herein and the embodiments characterized in the claims.

[0026.0.0.0] Accordingly, in a first embodiment, the invention relates to a process for the production of a fine chemical, whereby the fine chemical is at least one compound selected from the group consisting of tryptophane, proline, arginine, phenylalanine, tyrosine, alanine, glycine, threonine, serine, valine, isoleucine, leucine, raffinose, maltose, inositol, ferulic acid, malate, γ -tocopherol, α -tocopherol, β -tocopherol, cerotic acid, lignoceric acid, putrescine, sinapic acid, 3,4-dihydroxyphenylalanine (= DOPA), stearic acid and β -carotene. Accordingly, in the present invention, the term "the fine chemical" as used herein relates to an amino acid selected from the group consisting of tryptophane, proline, arginine, phenylalanine, tyrosine, alanine, glycine, threonine, serine, valine, isoleucine and leucine; a vitamin selected from the group consisting of γ -tocopherol, α -tocopherol and β -tocopherol, a fatty acid selected from the group consisting of cerotic acid, lignoceric acid and stearic acid, an organic acid selected from the group consisting of ferulic acid, malate and sinapic acid or a compound selected from the group consisting of raffinose, putrescine, 3,4-dihydroxyphenylalanine (= DOPA) and β -carotene or mixtures thereof containing at least two, three, four or five compounds selected from the aforementioned groups, preferably 6, 7, 8 or 9 compounds selected from the aforementioned groups, most preferably 10, 11, 12, 13, 14, 15, 16, 17 or more compounds selected from the aforementioned groups. Further, the term "the fine chemicals" as used herein also relates to fine chemicals comprising at least one compound selected from the group consisting of tryptophane, proline, arginine, phenylalanine, tyrosine, alanine, glycine, threonine, serine, valine, isoleucine, leucine, raffinose, maltose, inositol, ferulic acid, malate, γ -tocopherol, α -tocopherol, β -tocopherol, cerotic acid, lignoceric acid, putrescine, sinapic acid, 3,4-dihydroxyphenylalanine (= DOPA), stearic acid and β -carotene.

[0027.0.0.0] In one embodiment, the term "the fine chemical" or "fine chemical" means at least one compound selected from the group consisting of L-tryptophane, L-proline, L-arginine, L-phenylalanine, L-tyrosine, L-alanine, glycine, L-threonine, L-serine, L-valine, L-isoleucine, L-leucine, raffinose, maltose, inositol, ferulic acid, malate, γ -tocopherol, α -tocopherol, β -tocopherol, cerotic acid, lignoceric acid, putrescine, sinapic acid, 3,4-dihydroxyphenylalanine (= DOPA), stearic acid and β -carotene. Throughout the specification the term "the fine chemical" means the aforementioned compounds, its salts, ester or amids in free form or bound to other chemical compounds especially proteins. In a preferred embodiment, the term "the fine chemical" or "fine chemical" means at least one compound selected from the group consisting of L-tryptophane, L-proline, L-arginine, L-phenylalanine, L-tyrosine, L-alanine, glycine, L-threonine, L-serine, L-valine, L-isoleucine and L-leucine in free form or its salts or bound to proteins.

[0028.0.0.0] Accordingly, the present invention relates to a process for the production of fine chemical comprising

- (a) increasing or generating the biological activity represented by a protein as depicted in SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394 in a non-human organism, or in one or more parts thereof; and
- (b) growing the organism under conditions which permit the production of the fine chemical in said organism.

[0029.0.0.0] Comprises/comprising and grammatical variations thereof when used in this specification are to be taken to specify the presence of stated features, integers, steps or components or groups thereof, but not to preclude the presence or addition of one or more other features, integers, steps, components or groups thereof.

[0030.0.0.0] Preferably, this process further comprises the step of recovering the fine chemical, which is synthesized by the organism from the organism and/or from the culture medium used for the growth or maintenance of the organism. The term "recovering" means the isolation of the fine chemical in different purities, that means on the one hand harvesting of the biological material, which contains the fine chemical without further purification and on the other hand purities of the fine chemical between 5% and 100% purity, preferred purities are in the range of 10% and 99%. In one embodiment, the purities are 20%, 30%, 40%, 50%, 60%, 70%, 80%, 90%, 95% or 99% or more.

[0031.0.0.0] Advantageously the process for the production of the fine chemical leads to an enhanced production of the fine chemical. The terms "enhanced" or "increase" mean at least a 10%, 20%, 30%, 40% or 50%, preferably at least 60%, 70%, 80%, 90% or 100%, more preferably 150%, 200%, 300%, 400% or 500% higher production of the fine chemical in comparison to the reference as defined below, e.g. that means in comparison to an organism without the aforementioned modification of the activity of a protein having the biological activity represented by a protein as

depicted in SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394.

[0032.0.0.0] Surprisingly it was found, that the transgenic expression of the *Kluyveromyces lactis*, *Cryptococcus neoformans*, *Neurospora crassa*, *Penicillium marneffeii*, *Mucor rouxii*, *Schizophyllum commune*, *Paracoccidioides brasiliensis*, *Aspergillus fumigatus*, *Suillus bovinus*, *Candida albicans*, *Trichoderma reesei*, *Ashbya gossypii*, *Yarrowia lipolytica*, *Ustilago maydis*, *Emericella nidulans*, *Trichomonas vaginalis*, *Colletotrichum trifolii*, *Blumeria graminis*, *Dictyostelium discoideum*, *Saccharomyces cerevisiae*, *Schizosaccharomyces pombe*, *Entamoeba histolytica*, *Oryza sativa*, *Brassica napus*, *Glycine max*, *Beta vulgaris*, *Lotus japonicus*, *Zinnia elegans*, *Zea mays*, *Cicer arietinum*, *Arabidopsis thaliana*, *Hordeum vulgare*, *Nicotiana tabacum*, *Gossypium hirsutum*, *Physcomitrella patens*, *Fucus distichus*, *Medicago truncatula*, *Homo sapiens*, *Caenorhabditis elegans*, *Tigriopus japonicus*, *Rhopalosiphum padi*, *Mus musculus*, *Discopyge ommata*, *Canis lupus*, *Drosophila melanogaster*, *Anopheles gambiae*, *Aplysia californica*, *Ciona savignyi*, *Ciona intestinalis*, *Hemicentrotus pulcherrimus*, *Giardia lamblia*, *Gallus gallus*, *Brachydanio rerio*, *Xenopus laevis*, *Xenopus tropicalis*, *Schistosoma japonicum*, *Schistosoma mansoni*, *Encephalitozoon cuniculi*, *Wuchereria bancrofti*, *Cavia porcellus*, *Sus scrofa*, *Rattus norvegicus*, *Pneumocystis carinii* or *Pagrus major* proteins as depicted in SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394 for example in *Arabidopsis thaliana* conferred an increase in the fine chemical content of the transformed plants.

[0033.0.0.0] In accordance with the invention, the term "organism" as understood herein relates always to a non-human organism, in particular to an animal or plant organism or to a microorganism. Further, the term "animal" as understood herein relates always to a non-human animal.

- 5 **[0034.0.0.0]** The sequence depicted in SEQ ID NO: 1 (YNL090W) from *Saccharomyces cerevisiae* has been published in Madaule et al. [1987, "Characterization of two members of the rho gene family from the yeast *Saccharomyces cerevisiae*"; Proc. Natl. Acad. Sci., USA 84(3):779-83], and named as rho2. The gene encodes as all the other sequences mentioned above and use in the
- 10 inventive process a non-essential GTPase of the rho/rac subfamily of the ras-like GTPases. The protein may play a role in the establishment of cell polarity or in microtubule assembly. Accordingly, in one embodiment, the process of the present invention comprises the use of a gene product "involved in in the establishment of cell polarity or in microtubule assembly" from *Saccharomyces cerevisiae* or its homolog, e.g.
- 15 as shown herein, for the production of the fine chemical, meaning of preferably for the production of essential amino acids, in particular for increasing the amount of an essential amino acid in free or bound form in an organism or a part thereof, as mentioned herein. That means the increase of its biological activity by overexpression of the responsible gene leads to an increase of the fine chemical.
- 20 **[0035.0.0.0]** The term "biological activity" means the biological function of the protein of the invention. In contrast to the term "biological activity" the term "activity" means the increase in the production of the compound produced by the inventive process. The term "biological activity" preferably refers to for example the enzymatic function, transporter or carrier function, DNA-packaging function, heat shock protein function,
- 25 recombination protein function or regulatory function of a peptide or protein in an organism, a tissue, a cell or a cell compartment. Suitable substrates are low-molecular-weight compounds and also the protein interaction partners of a protein. The term "increase" of the biological function refers, for example, to the increase in binding capacity or binding strength of a protein for at least one substrate in an organism, a
- 30 tissue, a cell or a cell compartment - for example by one of the methods described herein below - in comparison with the wild type of the same genus and species to which this method has not been applied, under otherwise identical conditions (such as, for example, culture conditions, age of the plants and the like). Increase is also understood as meaning the modification of the substrate specificity as can be
- 35 expressed for example, by the k_{cat}/K_m value. In this context, an increase of the function of at least 10%, advantageously of at least 20%, preferably at least 30%, especially preferably of at least 40%, 50%, 60 %, 70%, 80%, 90% or more, very especially preferably of at least 150%, 200%, 250%, 300% or more, in comparison with the untreated organism is advantageous.

[0036.0.0.0] Homologues (= homologs) of the present gene products can be derived from any organisms as long as the homologue confers the herein mentioned activity, in particular, confers an increase in the fine chemical amount or content. Further, in the present invention, the term "homologue" relates to the sequence of an organism having the highest sequence homology to the herein mentioned or listed sequences of all expressed sequences of said organism. However, the person skilled in the art knows, that preferably, the homologue has said the fine chemical increasing activity and, if known, the same biological function or activity in the organism as the YNL090W protein as depicted in SEQ ID NO: 2. In one embodiment, the homolog of the SEQ ID NO: 2 is a homolog having said biological activity and being derived from Eukaryot such as plants like the families Anacardiaceae, Asteraceae, Apiaceae, Betulaceae, Boraginaceae, Brassicaceae, Bromeliaceae, Caricaceae, Cannabaceae, Convolvulaceae, Chenopodiaceae, Cucurbitaceae, Elaeagnaceae, Ericaceae, Euphorbiaceae, Fabaceae, Geraniaceae, Gramineae, Juglandaceae, Lauraceae, Leguminosae or Linaceae; algae, fungi or mosses. In another embodiment, the homolog of SEQ ID NO: 2 is a homolog having said activity and being derived from bacteria. In a further embodiment, the homolog of the SEQ ID NO: 2 is a homolog having said activity and being derived from fungi. I

[0037.0.0.0] Further homologs of are described herein below.

[0038.0.0.0] In accordance with the invention, a protein or polypeptide has the "the biological activity represented by a protein as depicted in SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394" if its *de novo* activity, or its increased expression directly or indirectly leads to an increased the fine chemical level in the organism or a part thereof, preferably in a cell of said organism and the protein has the above mentioned activities of a protein as depicted in SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248,

250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394. During the specification the activity or preferably the biological activity of such a protein or polypeptide or an nucleic acid molecule or sequence encoding such protein or polypeptide is identical or similar if it still has the biological or enzymatic activity of a protein as depicted in SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394, if it has at least 10% of the original biological or enzymatic activity, preferably 20%, particularly preferably 30%, most particularly preferably 40% in comparison to a protein as depicted in SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394 of *Kluyveromyces lactis*, *Cryptococcus neoformans*, *Neurospora crassa*, *Penicillium marneffeii*, *Mucor rouxii*, *Schizophyllum commune*, *Paracoccidioides brasiliensis*, *Aspergillus fumigatus*, *Suillus bovinus*, *Candida albicans*, *Trichoderma reesei*, *Ashbya gossypii*, *Yarrowia lipolytica*, *Ustilago maydis*, *Emericella nidulans*, *Trichomonas vaginalis*, *Colletotrichum trifolii*, *Blumeria graminis*, *Dictyostelium discoideum*, *Saccaromyces cerevisiae*, *Schizosaccharomyces pombe*, *Entamoeba histolytica*, *Oryza sativa*, *Brassica napus*, *Glycine max*, *Beta vulgaris*, *Lotus japonicus*, *Zinnia elegans*, *Zea mays*, *Cicer arietinum*, *Arabidopsis thaliana*, *Hordeum vulgare*, *Nicotiana tabacum*, *Gossypium hirsutum*, *Physcomitrella patens*, *Fucus distichus*, *Medicago truncatula*, *Homo sapiens*, *Caenorhabditis elegans*, *Tigriopus japonicus*, *Rhopalosiphum padi*, *Mus musculus*, *Discopyge ommata*, *Canis*

lupus, *Drosophila melanogaster*, *Anopheles gambiae*, *Aplysia californica*, *Ciona savignyi*, *Ciona intestinalis*, *Hemicentrotus pulcherrimus*, *Giardia lamblia*, *Gallus gallus*, *Brachydanio rerio*, *Xenopus laevis*, *Xenopus tropicalis*, *Schistosoma japonicum*, *Schistosoma mansoni*, *Encephalitozoon cuniculi*, *Wuchereria bancrofti*, *Cavia porcellus*, *Sus scrofa* and/or *Pagrus major*.

[0039.0.0.0] The terms "increased", "rised", "extended", "enhanced", "improved" or "amplified" relate to a corresponding change of a property in an organism, a part of an organism such as a tissue, seed, root, leave, flower etc. or in a cell and are interchangeable. Preferably, the overall activity in the volume is increased or enhanced in cases if the increase or enhancement is related to the increase or enhancement of an activity of a gene product, independent whether the amount of gene product or the specific activity of the gene product or both is increased or enhanced or whether the amount, stability or translation efficacy of the nucleic acid sequence or gene encoding for the gene product is increased or enhanced. The terms "reduction", "decrease" or "deletion" relate to a corresponding change of a property in an organism, a part of an organism such as a tissue, seed, root, leave, flower etc. or in a cell. Preferably, the overall activity in the volume is reduced, decreased or deleted in cases if the reduction, decrease or deletion is related to the reduction, decrease or deletion of an activity of a gene product, independent whether the amount of gene product or the specific activity of the gene product or both is reduced, decreased or deleted or whether the amount, stability or translation efficacy of the nucleic acid sequence or gene encoding for the gene product is reduced, decreased or deleted.

[0040.0.0.0] The terms "increase" or "decrease" relate to a corresponding change of a property an organism or in a part of an organism, such as a tissue, seed, root, leave, flower etc. or in a cell. Preferably, the overall activity in the volume is increased in cases the increase relates to the increase of an activity of a gene product, independent whether the amount of gene product or the specific activity of the gene product or both is increased or generated or whether the amount, stability or translation efficacy of the nucleic acid sequence or gene encoding for the gene product is increased.

[0041.0.0.0] Under "change of a property" it is understood that the activity, expression level or amount of a gene product or the metabolite content is changed in a specific volume relative to a corresponding volume of a control, reference or wild type, including the de novo creation of the activity or expression.

[0042.0.0.0] The terms "increase" or "decrease" include the change of said property in only parts of the subject of the present invention, for example, the modification can be found in compartment of a cell, like a organelle, or in a part of a plant, like tissue, seed, root, leave, flower etc. but is not detectable if the overall subject, i.e. complete cell or plant, is tested. Preferably, the increase or decrease is found cellular, thus the term "increase of an acitivity" or "increase of a metabolite content" relates to the cellular

increase compared to the wild type cell. Typically said increase is based on the higher content of the transcribed nucleic acid or the protein translated from said nucleic acid sequence in the modified cell in comparison to the wild type cell.

5 **[0043.0.0.0]** Accordingly, the term "increase" or "decrease" means that the specific activity of an enzyme as well as the amount of a compound or metabolite, e.g. of a polypeptide, a nucleic acid molecule or of the fine chemical of the invention or an encoding mRNA or DNA, can be increased or decreased in a volume.

10 **[0044.0.0.0]** The terms "wild type", "control" or "reference" are exchangeable and can be a cell or a part of organisms such as an organelle or a tissue, or an organism, in particular a microorganism or a plant, which was not modified or treated according to the herein described process according to the invention. Accordingly, the cell or a part of organisms such as an organelle or a tissue, or an organism, in particular a microorganism or a plant used as wild type, control or reference corresponds to the cell, organism or part thereof as much as possible and is in any other property but in the
15 result of the process of the invention as identical to the subject matter of the invention as possible. Thus, the wild type, control or reference is treated identically or as identical as possible, saying that only conditions or properties might be different which do not influence the quality of the tested property.

[0045.0.0.0] Preferably, any comparison is carried out under analogous conditions.
20 The term "analogous conditions" means that all conditions such as, for example, culture or growing conditions, assay conditions (such as buffer composition, temperature, substrates, pathogen strain, concentrations and the like) are kept identical between the experiments to be compared.

[0046.0.0.0] The "reference", "control", or "wild type" is preferably a subject, e.g. an
25 organelle, a cell, a tissue, an organism, in particular a plant or a microorganism, which was not modified or treated according to the herein described process of the invention and is in any other property as similar to the subject matter of the invention as possible. The reference, control or wild type is in its genome, transcriptome, proteome or metabolome as similar as possible to the subject of the present invention. Preferably, the
30 term "reference-" "control-" or "wild type-"-organelle, -cell, -tissue or -organism, in particular plant or microorganism, relates to an organelle, cell, tissue or organism, in particular plant or microorganism, which is nearly genetically identical to the organelle, cell, tissue or organism, in particular microorganism or plant, of the present invention or a part thereof preferably 95%, more preferred are 98%, even more preferred are
35 99,00%, in particular 99,10%, 99,30%, 99,50%, 99,70%, 99,90%, 99,99%, 99,999% or more.. Most preferable the "reference", "control", or "wild type" is a subject, e.g. an organelle, a cell, a tissue, an organism, which is genetically identical to the organism, cell or organelle used according to the process of the invention except that the responsible or activity conferring nucleic acid molecules or the gene product encoded

by them are amended, manipulated, exchanged or introduced according to the inventive process.

[0047.0.0.0] Preferably, the reference, control or wild type differs from the subject of the present invention only in the cellular activity of the polypeptide of the invention, e.g. as result of an increase in the level of the nucleic acid molecule of the present invention or an increase of the specific activity of the polypeptide of the invention, e.g. by or in the expression level or activity of an protein having the biological activity represented by a protein as depicted in SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394 or its homologs, its biochemical or genetical causes and the increased amount of the fine chemical.

[0048.0.0.0] In case, a control, reference or wild type differing from the subject of the present invention only by not being subject of the process of the invention can not be provided, a control, reference or wild type can be an organism in which the cause for the modulation of an activity conferring the increase of the fine chemical or expression of the nucleic acid molecule of the invention as described herein has been switched back or off, e.g. by knocking out the expression of responsible gene product, e.g. by antisense inhibition, by inactivation of an activator or agonist, by activation of an inhibitor or antagonist, by inhibition through adding inhibitory antibodies, by adding active compounds as e.g. hormones, by introducing negative dominant mutants, etc. A gene production can for example be knocked out by introducing inactivating point mutations, which lead to an enzymatic activity inhibition or a destabilization or an inhibition of the ability to bind to cofactors etc.

[0049.0.0.0] Accordingly, preferred reference subject is the starting subject of the present process of the invention. Preferably, the reference and the subject matter of the invention are compared after standardization and normalization, e.g. to the amount of total RNA, DNA, or protein or activity or expression of reference genes, like housekeeping genes, such as ubiquitin, actin or ribosomal proteins.

[0050.0.0.0] A series of mechanisms exists via which a modification of the a protein, e.g. the polypeptide of the invention can directly or indirectly affect the yield, production and/or production efficiency of the amino acid.

5 **[0051.0.0.0]** For example, the molecule number or the specific activity of the polypeptide or the nucleic acid molecule may be increased. Larger amounts of the fine chemical can be produced if the polypeptide or the nucleic acid of the invention is expressed *de novo* in an organism lacking the activity of said protein. However, it is also possible to increase the expression of the gene which is naturally present in the organisms, for example by modifying the regulation of the gene, or by increasing the
10 stability of the corresponding mRNA or of the corresponding gene product encoded by the nucleic acid molecule of the invention, or by introducing homologous genes from other organisms which are differently regulated, eg. not feedback sensitive or not feedback regulated.

15 **[0052.0.0.0]** This also applies analogously to the combined increased expression of the nucleic acid molecule of the present invention or its gene product with that of further enzymes of the biochemical pathway of the fine chemical e.g. of the amino acid biosynthesis pathway, e.g. which are useful for the synthesis of the fine chemicals.

20 **[0053.0.0.0]** The increase, decrease or modulation according to this invention can be constitutive, e.g. due to a stable permanent transgenic expression or to a stable mutation in the corresponding endogenous gene encoding the nucleic acid molecule of the invention or to a modulation of the expression or of the behaviour of a gene conferring the expression of the polypeptide of the invention, or transient, e.g. due to an transient transformation or temporary addition of a modulator such as a agonist or antagonist or inducible, e.g. after transformation with a inducible construct carrying the
25 nucleic acid molecule of the invention under control of a induceable promoter and adding the inducer, e.g. tetracycline or as described herein below.

30 **[0054.0.0.0]** The increase in activity of the polypeptide amounts in a cell, a tissue, a organelle, an organ or an organism or a part thereof preferably to at least 5%, preferably to at least 20% or at to least 50%, especially preferably to at least 70%, 80%, 90% or more, very especially preferably are to at least 200%, 300% or 400%, most preferably are to at least 500%, 600% or more in comparison to the control, reference or wild type.

35 **[0055.0.0.0]** The specific activity of a polypeptide encoded by a nucleic acid molecule of the present invention or of the polypeptide of the present invention can be tested as described in the examples. In particular, the expression of a protein in question in a cell, e.g. a plant cell or a microorganism and the detection of an increase the fine chemical level in comparison to a control is an easy test and can be performed as described in the state of the art.

[0056.0.0.0] The term "increase" includes, that a compound or an activity is introduced into a cell *de novo* or that the compound or the activity has not been detectable before, in other words it is "generated".

5 **[0057.0.0.0]** Accordingly, in the following, the term "increasing" also comprises the term "generating" or "stimulating". The increased activity manifests itself in an increase of the fine chemical.

[0058.0.0.0] In case the biological activity of the *Saccaromyces cerevisiae* protein YNL090W as depicted in SEQ ID NO: 2, or the biological activity of the of *Kluyveromyces lactis*, *Cryptococcus neoformans*, *Neurospora crassa*, *Penicillium marneffeii*, *Mucor rouxii*, *Schizophyllum commune*, *Paracoccidioides brasiliensis*, *Aspergillus fumigatus*, *Suillus bovinus*, *Candida albicans*, *Trichoderma reesei*, *Ashbya gossypii*, *Yarrowia lipolytica*, *Ustilago maydis*, *Emericella nidulans*, *Trichomonas vaginalis*, *Colletotrichum trifolii*, *Blumeria graminis*, *Dictyostelium discoideum*, *Schizosaccharomyces pombe*, *Entamoeba histolytica*, *Oryza sativa*, *Brassica napus*, *Glycine max*, *Beta vulgaris*, *Lotus japonicus*, *Zinnia elegans*, *Zea mays*, *Cicer arietinum*, *Arabidopsis thaliana*, *Hordeum vulgare*, *Nicotiana tabacum*, *Gossypium hirsutum*, *Physcomitrella patens*, *Fucus distichus*, *Medicago truncatula*, *Homo sapiens*, *Caenorhabditis elegans*, *Tigriopus japonicus*, *Rhopalosiphum padi*, *Mus musculus*, *Discopyge ommata*, *Canis lupus*, *Drosophila melanogaster*, *Anopheles gambiae*, *Aplysia californica*, *Ciona savignyi*, *Ciona intestinalis*, *Hemicentrotus pulcherrimus*, *Giardia lamblia*, *Gallus gallus*, *Brachydanio rerio*, *Xenopus laevis*, *Xenopus tropicalis*, *Schistosoma japonicum*, *Schistosoma mansoni*, *Encephalitozoon cuniculi*, *Wuchereria bancrofti*, *Cavia porcellus*, *Sus scrofa*, *Rattus norvegicus*, *Pneumocystis carinii* or *Pagrus major* proteins as depicted SEQ ID NO: 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 25 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 30 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 35 392 or 394 or its homologs is increased, preferably, in one embodiment an increase of the fine chemical of at least 100%, 150%, or preferably to at least 200%, 250%, 300%, 350% or 400%, especially preferably to at least 450%, 500%, 550%, 600% or more is conferred.

[0059.0.0.0] In case the biological activity of the *Saccaromyces cerevisiae* protein YNL090W as depicted in SEQ ID NO: 2, or the biological activity of the *Kluyveromyces*

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- lactis, *Cryptococcus neoformans*, *Neurospora crassa*, *Penicillium marneffei*, *Mucor rouxii*, *Schizophyllum commune*, *Paracoccidioides brasiliensis*, *Aspergillus fumigatus*, *Suillus bovinus*, *Candida albicans*, *Trichoderma reesei*, *Ashbya gossypii*, *Yarrowia lipolytica*, *Ustilago maydis*, *Emericella nidulans*, *Trichomonas vaginalis*, *Colletotrichum trifolii*, *Blumeria graminis*, *Dictyostelium discoideum*, *Schizosaccharomyces pombe*, *Entamoeba histolytica*, *Oryza sativa*, *Brassica napus*, *Glycine max*, *Beta vulgaris*, *Lotus japonicus*, *Zinnia elegans*, *Zea mays*, *Cicer arietinum*, *Arabidopsis thaliana*, *Hordeum vulgare*, *Nicotiana tabacum*, *Gossypium hirsutum*, *Physcomitrella patens*, *Fucus distichus*, *Medicago truncatula*, *Homo sapiens*, *Caenorhabditis elegans*, *Tigriopus japonicus*, *Rhopalosiphum padi*, *Mus musculus*, *Discopyge ommata*, *Canis lupus*, *Drosophila melanogaster*, *Anopheles gambiae*, *Aplysia californica*, *Ciona savignyi*, *Ciona intestinalis*, *Hemicentrotus pulcherrimus*, *Giardia lamblia*, *Gallus gallus*, *Brachydanio rerio*, *Xenopus laevis*, *Xenopus tropicalis*, *Schistosoma japonicum*, *Schistosoma mansoni*, *Encephalitozoon cuniculi*, *Wuchereria bancrofti*, *Cavia porcellus*, *Sus scrofa*, *Rattus norvegicus*, *Pneumocystis carinii* or *Pagrus major* proteins as depicted SEQ ID NO: 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394 or its homologs is increased, preferably, an increase of the fine chemical in conferred, preferably of the fine chemical such as essential amino acids e.g. tryptophane, arginine, phenylalanine, tyrosine, threonine, valine, isoleucine and/or leucine, non-essential amino acids e.g. proline, alanine, glycine or serine, modified amino acids e.g. 3,4-dihydroxyphenylalanine, carbohydrates e.g. raffinose, inositol or iso-maltose, vitamins e.g. α -tocopherol, β -tocopherol or γ -tocopherol, organic acids e.g. ferulic acid, sinapic acid or malate, fatty acids e.g. cerotic acid, lignoceric acid, 2-hydroxy-palmitic acid or stearic acid, carotinoids e.g. β -carotene or mixtures thereof is conferred.
- [0060.0.0.0]** In this context, the fine chemical amount in a cell, preferably in a tissue, more preferred in a organism as a plant or a microorganism or part thereof, is increased by at least 3%, 4%, 5%, 6%, 7%, 8% or 9% or more, especially preferably are at least 10%, 20%, 40%, 50% or more, very especially preferably are more than 60%, 70%, 80%, 90%, 100% or more and most preferably are 150% or more, such as 200%, 250%, 300%, 350%, 400%, 450%, 500%, 550% or 600%.

[0061.0.0.0] The fine chemical can be contained in the organism either in its free form and/or bound to proteins, polypeptids or other compounds such as polysaccharides, lipids, glycoproteins or glycolipids etc. or mixtures thereof.

Accordingly, in one embodiment, the amount of the free form in a cell, preferably in a tissue, more preferred in a organism as a plant or a microorganism or part thereof, is increased by at least 3%, 4%, 5%, 6%, 7%, 8% or 9% or more, especially preferably are at least 10%, 20%, 40%, 50% or more, very especially preferably are more than 60%, 70%, 80%, 90%, 100% or more and most preferably are 150% or more, such as 200%, 250%, 300%, 350%, 400%, 450%, 500%, 550% or 600%. Accordingly, in an other embodiment, the amount of the bound the fine chemical in a cell, preferably in a tissue, more preferred in a organism as a plant or a microorganism or part thereof, is increased by at least 3%, 4%, 5%, 6%, 7%, 8% or 9% or more, especially preferably are at least 10%, 20%, 40%, 50% or more, very especially preferably are more than 60%, 70%, 80%, 90%, 100% or more and most preferably are 150% or more, such as 200%, 250%, 300%, 350%, 400%, 450%, 500%, 550% or 600%.

[0062.0.0.0] A protein having an activity conferring an increase in the amount or level of the fine chemical preferably has the structure of the polypeptide described herein, in particular of the polypeptides comprising the consensus sequence shown in SEQ ID NO: 47, SEQ ID NO: 48, SEQ ID NO: 49, SEQ ID NO: 50, SEQ ID NO: 51, SEQ ID NO: 52, SEQ ID NO: 397, SEQ ID NO: 398, SEQ ID NO: 399 and/or SEQ ID NO: 400 as described herein, or is encoded by the nucleic acid molecule characterized herein or the nucleic acid molecule according to the invention, for example by the nucleic acid molecule as shown in SEQ ID NO: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, 43, 45, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83, 85, 87, 89, 91, 93, 95, 97, 99, 101, 103, 105, 107, 109, 111, 113, 115, 117, 119, 121, 123, 125, 127, 129, 131, 133, 135, 137, 139, 141, 143, 145, 147, 149, 151, 153, 155, 157, 159, 161, 163, 165, 167, 169, 171, 173, 175, 177, 179, 181, 183, 185, 187, 189, 191, 193, 195, 197, 199, 201, 203, 205, 207, 209, 211, 213, 215, 217, 219, 221, 223, 225, 227, 229, 231, 233, 235, 237, 239, 241, 243, 245, 247, 249, 251, 253, 255, 257, 259, 261, 263, 265, 267, 269, 271, 273, 275, 277, 279, 281, 283, 285, 287, 289, 291, 293, 295, 297, 299, 301, 303, 305, 307, 309, 311, 313, 315, 317, 319, 321, 323, 325, 327, 329, 331, 333, 335, 337, 339, 341, 343, 345, 347, 349, 351, 353, 355, 357, 359, 361, 363, 365, 367, 369, 371, 373, 375, 377, 379, 381, 383, 385, 387, 389, 391 or 393 or its herein described functional homologues and has the herein mentioned activity.

[0063.0.0.0] For the purposes of the present invention, the terms "the fine chemical" or "fine chemical" such as essential amino acids e.g. tryptophane, arginine, phenylalanine, tyrosine, threonine, valine, isoleucine and/or leucine, non-essential amino acids e.g. proline, alanine, glycine or serine, modified amino acids e.g. 3,4-dihydroxyphenylalanine, carbohydrates e.g. raffinose, inositol or iso-maltose, vitamins e.g. α -tocopherol, β -tocopherol or γ -tocopherol, organic acids e.g. ferulic acid, sinapic acid or malate, fatty acids e.g. cerotic acid, lignoceric acid, 2-hydroxy-palmitic acid or

stearic acid, carotinoids e.g. β -carotene or mixtures thereof also encompass the corresponding salts, such as, for example, tryptophane hydrochloride, arginine hydrochloride, phenylalanine hydrochloride, tyrosine hydrochloride, threonine hydrochloride, valine hydrochloride, isoleucine hydrochloride or leucine hydrochloride or tryptophane sulfate, arginine sulfate, phenylalanine sulfate, tyrosine sulfate, threonine sulfate, valine sulfate, isoleucine sulfate or leucine sulfate; ester or amides.

[0064.0.0.0] Owing to the biological activity of the proteins which are used in the process according to the invention and which are encoded by nucleic acid molecules according to the invention, it is possible to produce compositions comprising the fine chemical, i.e. an increased amount of the free chemical free or bound, e.g. amino acid compositions. Depending on the choice of the organism used for the process according to the present invention, for example a microorganism or a plant, compositions or mixtures of various fine chemicals e.g. amino acids can be produced.

[0065.0.0.0] The term "expression" refers to the transcription and/or translation of a codogenic gene segment or gene. As a rule, the resulting product is an mRNA or a protein. However, expression products can also include functional RNAs such as, for example, antisense, nucleic acids, tRNAs, snRNAs, rRNAs, RNAi, siRNA, ribozymes etc. Expression may be systemic, local or temporal, for example limited to certain cell types, tissuesorgans or time periods.

[0066.0.0.0] In one embodiment, the process of the present invention comprises one or more of the following steps:

- a) stabilizing a protein conferring the increased expression of a protein encoded by the nucleic acid molecule of the invention or of the protein of the invention, e.g. of a protein having the biological activity represented by a protein as depicted in SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394 or its homologs having the fine chemical increasing activity;

- b) stabilizing a mRNA conferring the increased expression of a protein encoded by the nucleic acid molecule of the invention, e.g. of a protein having the biological activity represented by a protein as depicted in SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394 or its homologs or of an mRNA encoding the polypeptide of the present invention having the fine chemical increasing activity;
- c) increasing the specific activity of a protein conferring the increased expression of a protein encoded by the nucleic acid molecule of the invention or of the protein of the invention having the fine chemical increasing activity, e.g. of a protein having the biological activity represented by a protein as depicted in SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394 or its homologs, or decreasing the inhibitory regulation of the protein of the invention;
- d) generating or increasing the expression of an endogenous or artificial transcription factor mediating the expression of a protein conferring the increased expression of a protein encoded by the nucleic acid molecule of the invention or of the protein of the invention having the fine chemical increasing activity, e.g. of a polypeptide having the biological activity represented by a protein as depicted in SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120,

- 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394 or its homologs;
- 5 - e) stimulating activity of a protein conferring the increased expression of a protein encoded by the nucleic acid molecule of the present invention or a protein of the present invention having the fine chemical increasing activity, e.g. of a protein having the biological activity represented by a protein as depicted in SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394 or its homologs, by adding one or more exogenous inducing factors to the organismus or parts thereof;
- 10 - f) expressing a transgenic gene encoding a protein conferring the increased expression of a polypeptide (= protein) encoded by the nucleic acid molecule or the protein of the invention, having the fine chemical increasing activity, e.g. of a protein having the biological activity represented by a protein as depicted in SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350,

352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394 or its homologs;

- g) increasing the copy number of a gene conferring the increased expression of a nucleic acid molecule encoding a protein encoded by the nucleic acid molecule of the invention or the protein of the invention the fine chemical increasing activity, e.g. of a protein having the biological activity represented by a protein as depicted in SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394 or its homologs;
- h) increasing the expression of the endogenous gene encoding the protein of the invention, e.g. a protein having the biological activity represented by a protein as depicted in SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394 or its homologs, by adding positive expression or removing negative expression elements, e.g. homologous recombination can be used to either introduce positive regulatory elements like for plants the 35S enhancer into the promoter or to remove repressor elements form regulatory regions. Further gene conversion methods can be used to disrupt repressor elements or to enhance to acitivity of positive elements. Positive elements can be randomly introduced in plants by T-DNA or transposon mutagenesis and lines can be identified in which the positive elements have be integrated near to a gene of the invention, the expression of which is thereby enhanced;

- i) modulating growth conditions of an organism in such a manner, that the expression or activity of the gene encoding the protein of the invention or the protein itself is enhanced for example microorganisms or plants can be grown under a higher temperature regime leading to an enhanced expression of heat shock proteins, e.g. the heat shock protein of the invention, which can lead an enhanced the fine chemical production; and/or
- j) selecting of organisms with expecially high activity of the protein of the invention from natural or from mutagenized resources and breeding them into the target organisms, eg the elite crops.

10 **[0067.0.0.0]** Preferably, said mRNA is the nucleic acid molecule of the invention and/or the protein conferring the increased expression of a protein encoded by the nucleic acid molecule of the invention or the polypeptide having the herein mentioned activity, e.g. conferring the increase of the fine chemical after increasing the expression or activity of the encoded polypeptide or having the activity of a polypeptide having

15 biological activity represented by a protein as depicted in SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176,

20 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346,

25 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394 or its homologs.

[0068.0.0.0] In general, the amount of mRNA, polynucleotide or nucleic acid molecule in a cell or a compartment of an organism correlates with the amount of encoded protein and thus with the overall activity of the encoded protein in said

30 volume. Said correlation is not always linear, the activity in the volume is dependent on the stability of the molecules, the degradation of the molecules or the presence of activating or inhibiting co-factors. Further, product and educt inhibitions of enzymes are well known and described in textbooks, e.g. Stryer, Biochemistry or Zinser et al. "Enzyminhibitoren"/Enzyme inhibitors".

35 **[0069.0.0.0]** The activity of the abovementioned proteins and/or polypeptide encoded by the nucleic acid molecule of the present invention can be increased in various ways. For example, the activity in an organism or in a part thereof, like a cell, is increased via increasing the gene product number, e.g. by increasing the expression rate, like introducing a stronger promoter, or by increasing the stability of the mRNA expressed,

thus increasing the translation rate, and/or increasing the stability of the gene product, thus reducing the proteins decayed. Further, the activity or turnover of enzymes can be influenced in such a way that a reduction or increase of the reaction rate or a modification (reduction or increase) of the affinity to the substrate results, is reached. A mutation in the catalytic centre of a polypeptide of the invention, e.g. an enzyme, can modulate the turn over rate of the enzyme, e.g. a knock out of an essential amino acid can lead to a reduced or completely knock out activity of the enzyme, or the deletion or mutation of regulator binding sites can reduce a negative regulation like a feedback inhibition (or a substrate inhibition, if the substrate level is also increased). The specific activity of an enzyme of the present invention can be increased such that the turn over rate is increased or the binding of a co-factor is improved. Improving the stability of the encoding mRNA or the protein can also increase the activity of a gene product. The stimulation of the activity is also under the scope of the term "increased activity".

[0070.0.0.0] Moreover, the regulation of the abovementioned nucleic acid sequences may be modified so that gene expression is increased. This can be achieved advantageously by means of heterologous regulatory sequences or by modifying, for example mutating, the natural regulatory sequences which are present. The advantageous methods may also be combined with each other.

[0071.0.0.0] In general, an activity of a gene product in an organism or part thereof, in particular in a plant cell, a plant, or a plant tissue or a part thereof or in a microorganism can be increased by increasing the amount of the specific encoding mRNA or the corresponding protein in said organism or part thereof. "Amount of protein or mRNA" is understood as meaning the molecule number of polypeptides or mRNA molecules in an organism, a tissue, a cell or a cell compartment. "Increase" in the amount of a protein means the quantitative increase of the molecule number of said protein in an organism, a tissue, a cell or a cell compartment or part thereof - for example by one of the methods described herein below - in comparison to a wild type, control or reference.

[0072.0.0.0] The increase in molecule number amounts preferably to at least 1%, preferably to more than 10%, more preferably to 30% or more, especially preferably to 50%, 70% or more, very especially preferably to 100%, most preferably to 500% or more. However, a de novo expression is also regarded as subject of the present invention.

[0073.0.0.0] A modification, i.e. an increase or decrease, can be caused by endogenous or exogenous factors. For example, an increase in activity in an organism or a part thereof can be caused by adding a gene product or a precursor or an activator or an agonist to the media or nutrition or can be caused by introducing said subjects into a organism, transient or stable.

[0074.0.0.0] In one embodiment the increase in the amount of the fine chemical in the organism or a part thereof, e.g. in a cell, a tissue, an organ, an organelle etc., is achieved by increasing the endogenous level of the polypeptide of the invention. Accordingly, in an embodiment of the present invention, the present invention relates to a process wherein the gene copy number of a gene encoding the polynucleotide or nucleic acid molecule of the invention is increased. Further, the endogenous level of the polypeptide of the invention can for example be increased by modifying the transcriptional or translational regulation of the polypeptide.

[0075.0.0.0] In one embodiment the amount of the fine chemical in the organism or part thereof can be increase by targeted or random mutagenesis of the endogenous genes of the invention. For example homologous recombination can be used to either introduce positive regulatory elements like for plants the 35S enhancer into the promoter or to remove repressor elements form regulatory regions. In addition gene conversion like methods described by Kochevenko and Willmitzer (Plant Physiol. 2003 May;132(1):174-84) and citations therein can be used to disrupt repressor elements or to enhance to acitivity of positive regulatory elements. Furthermore positive elements can be randomly introduced in (plant) genomes by T-DNA or transposon mutagenesis and lines can be screened for, in which the positive elements has be integrated near to a gene of the invention, the expression of which is thereby enhanced. The activation of plant genes by random integrations of enhancer elements has been described by Hayashi et al., 1992 (Science 258:1350-1353) or Weigel et al., 2000 (Plant Physiol. 122, 1003-1013) and others cited therein. Reverse genetic strategies to identify insertions (which eventually carrying the activation elements) near in genes of interest have been described for various cases eg. Krysan et al., 1999 (Plant Cell 1999, 11, 2283-2290); Sessions et al., 2002 (Plant Cell 2002, 14, 2985-2994); Young et al., 2001, (Plant Physiol. 2001, 125, 513-518); Koprek et al., 2000 (Plant J. 2000, 24, 253-263) ; Jeon et al., 2000 (Plant J. 2000, 22, 561-570) ; Tissier et al., 1999 (Plant Cell 1999, 11, 1841-1852); Speulmann et al., 1999 (Plant Cell 1999 ,11 , 1853-1866). Briefly material from all plants of a large T-DNA or transposon mutagenized plant population is harvested and genomic DNA prepared. Then the genomic DNA is pooled following specific architectures as described for example in Krysan et al., 1999 (Plant Cell 1999, 11, 2283-2290). Pools of genomics DNAs are then screened by specific multiplex PCR reactions detecting the combination of the insertional mutagen (eg T-DNA or Transposon) and the gene of interest. Therefore PCR reactions are run on the DNA pools with specific combinations of T-DNA or transposon border primers and gene specific primers. General rules for primer design can again be taken from Krysan et al., 1999 (Plant Cell 1999, 11, 2283-2290) Rescreening of lower levels DNA pools lead to the identifcation of individual plants in which the gene of interest is disrupted by the insertional mutagen. The enhancement of positive regulatory elements or the disruption or weaking of negative regulatory elements can also be achieved through common mutagenesis

techniques: The production of chemically or radiation mutated populations is a common technique and known to the skilled worker. Methods for plants are described by Koorneef et al. 1982 and the citations therein and by Lightner and Caspar in "Methods in Molecular Biology" Vol 82. These techniques usually induce pointmutations that can be identified in any known gene using methods such as TILLING (Colbert et al. 2001).

[0076.0.0.0] Accordingly, the expression level can be increased if the endogenous genes encoding a polypeptide conferring an increased expression of the polypeptide of the present invention, in particular genes comprising the nucleic acid molecule of the present invention, are modified via homologous recombination, Tilling approaches or gene conversion.

[0077.0.0.0] Regulatory sequences can be operatively linked to the coding region of an endogenous protein and control its transcription and translation or the stability or decay of the encoding mRNA or the expressed protein. In order to modify and control the expression, promoter, UTRs, splicing sites, processing signals, polyadenylation sites, terminators, enhancers, repressors, post transcriptional or posttranslational modification sites can be changed, added or amended for example, the activation of plant genes by random integrations of enhancer elements has been described by Hayashi et al., 1992 (Science 258:1350-1353) or Weigel et al., 2000 (Plant Physiol. 122, 1003-1013) and others cited therein. For example, the expression level of the endogenous protein can be modulated by replacing the endogenous promoter with a stronger transgenic promoter or by replacing the endogenous 3'UTR with a 3'UTR, which provides more stability without amending the coding region. Further, the transcriptional regulation can be modulated by introduction of an artificial transcription factor as described in the examples. Alternative promoters, terminators and UTR are described below.

[0078.0.0.0] The activation of an endogenous polypeptide having the fine chemical increasing activity, e.g. having the biological activity represented by a protein as depicted in SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394, e.g. conferring the increase of the fine chemical after increase of expression or activity can also be increased by introducing a synthetic transcription factor, which binds close to

the coding region of the protein of the invention encoding gene and activates its transcription. A chimeric zinc finger protein can be construed, which comprises a specific DNA-binding domain and an activation domain as e.g. the VP16 domain of Herpes Simplex virus. The specific binding domain can bind to the regulatory region of the nucleic acid sequence used in the inventive process. The expression of the chimeric transcription factor in an organism, in particular in a plant, leads to a specific expression of the protein of the invention, see e.g. in WO01/52620, Oriz, Proc. Natl. Acad. Sci. USA, 2002, Vol. 99, 13290 or Guan, Proc. Natl. Acad. Sci. USA, 2002, Vol. 99, 13296.

10 **[0079.0.0.0]** In one further embodiment of the process according to the invention, organisms are used in which one of the abovementioned genes, or one of the abovementioned nucleic acids, is mutated in a way that the activity of the encoded gene products is less influenced by cellular factors, or not at all, in comparison with the unmutated proteins. For example, well known regulation mechanism of enzymic activity are substrate inhibition or feed back regulation mechanisms. Ways and techniques for the introduction of substitutions, deletions and additions of one or more bases, nucleotides or amino acids of a corresponding sequence are described herein below in the corresponding paragraphs and the references listed there, e.g. in Sambrook et al., Molecular Cloning, Cold Spring Harbour, NY, 1989. The person skilled in the art will be able to identify regulation domains and binding sites of regulators by comparing the sequence of the nucleic acid molecule of the present invention or the expression product thereof with the state of the art by computer software means which comprise algorithms for the identifying of binding sites and regulation domains or by introducing into a nucleic acid molecule or in a protein systematically mutations and assaying for those mutations which will lead to an increased specific activity or an increased activity per volume, in particular per cell.

30 **[0080.0.0.0]** It is therefore advantageously to express in an organism a nucleic acid molecule of the invention or a polypeptide of the invention derived from a evolutionary distantly related organism, as e.g. using a prokaryotic gene in a eukaryotic host, as in these cases the regulation mechanism of the host cell may not weaken the activity (cellular or specific) of the gene or its expression product

[0081.0.0.0] The mutation is introduced in such a way that the production of the fine chemical is not adversely affected.

35 **[0082.0.0.0]** Less influence on the regulation of a gene or its gene product is understood as meaning a reduced regulation of the enzymatic activity leading to an increased specific or cellular activity of the gene or its product. An increase of the enzymatic activity is understood as meaning an enzymatic activity, which is increased by at least 10%, 20%, 30%, 40% or 50%, advantageously by at least 60%, 70%, 80%, 90% or 100%, especially advantageously by at least 150%, 200%, 300% or more in

comparison with the starting organism. In the event the inventive nucleic acid sequences were introduced into an organism, which did not have the encoded protein activity, said new generated enzymatic activity shall also be embraced by the herein described invention. This leads to an increased productivity of the desired fine chemical.

[0083.0.0.0] Owing to the introduction of a gene or a plurality of genes conferring the expression of the nucleic acid molecule of the invention or the polypeptide of the invention as described below, for example the nucleic acid construct mentioned below, or e.g. encoding the protein as depicted in SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394 into an organism alone or in combination with other genes, it is possible not only to increase the biosynthetic flux towards the end product, but also to increase, modify or create *de novo* an advantageous, preferably novel metabolites composition in the organism, e.g. an advantageous amino acid composition comprising a higher content of (from a viewpoint of nutritional physiology limited) amino acids, for example essential amino acids like tryptophane, threonine, methionine or lysine.

[0084.0.0.0] Preferably the composition comprises further higher amounts of metabolites positively affecting or lower amounts of metabolites negatively affecting the nutrition or health of animals or humans provided with said compositions or organisms of the invention or parts thereof. Likewise, the number or activity of further genes which are required for the import or export of nutrients or metabolites, including for example amino acids or its precursors, required for the cell's biosynthesis of the fine chemical may be increased so that the concentration of necessary or relevant precursors, cofactors or intermediates within the cell(s) or within the corresponding storage compartments is increased. Owing to the increased or novel generated activity of the polypeptide of the invention or owing to the increased number of nucleic acid sequences of the invention and/or to the modulation of further genes which are involved in the biosynthesis of the fine chemical, e.g. by increasing the activity of enzymes synthesizing precursors or by destroying the activity of one or more genes which are involved in the breakdown of the fine chemical, it is thereby possible to increase the yield, production and/or production efficiency of the fine chemical in the host organism, such as plants or microorganisms.

[0085.0.0.0] Accordingly, in one embodiment, the process according to the invention relates to a process, which comprises:

- a) providing a non-human organism, preferably a microorganism, non-human animal, plant or part, cell or tissue thereof;
 - 5 b) increasing the biological activity represented by a protein as depicted in SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 10 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 15 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394 or of a polypeptide being encoded by the nucleic acid molecule of the invention and described below, i.e. conferring an increase of the fine chemical in the organism, preferably in the microorganism, the non-human animal, the plant or part, cell or tissue thereof, 20
 - c) growing the organism, preferably the microorganism, the non-human animal, the plant or part, cell or tissue thereof under conditions which permit the production of the fine chemical; and
 - d) if desired, recovering, optionally isolating, the free and/or bound fine chemical.
- 25 **[0086.0.0.0]** The organism, in particular the microorganism, non-human animal, the plant or animal parts, the plant or animal cell, the plant or animal tissue or the plant is advantageously grown in such a way that it is not only possible to recover, if desired isolate the free or bound fine chemical (Galili et al., Transgenic Res., 2000, 9, 2, 137-144).
- 30 **[0087.0.0.0]** After the above-described increasing (which as defined above also encompasses the generating of an activity in an organism, i.e. a *de novo* activity), for example after the introduction and the expression of the nucleic acid molecules of the invention or described in the methods or processes according to the invention, the organism according to the invention, advantageously, a microorganism, a non-human 35 animal, a plant, plant or animal tissue or plant or animal cell, is grown and subsequently harvested.

[0088.0.0.0] Suitable organisms or host organisms (transgenic organism) for the nucleic acid molecule used according to the invention and for the inventive process, the nucleic acid construct or the vector (both as described below) are, in principle, all organisms which are capable of synthesizing the fine chemical, and which are suitable for the activation, introduction or stimulation genes. Examples which may be mentioned are plants, microorganisms such as fungi, bacteria, yeasts, alga or diatom, transgenic or obtained by site directed mutagenesis or random mutagenesis combined with specific selection procedures. Preferred organisms are those which are naturally capable of synthesizing the fine chemical in substantial amounts, like fungi, yeasts, bacteria or plants. In principle, transgenic animals, for example *Caenorhabditis elegans*, are also suitable as host organisms.

[0089.0.0.0] In the event that the transgenic organism is a microorganism, such as a eukaryotic organism, for example a fungus, an alga, diatom or a yeast in particular a fungus, alga, diatom or yeast selected from the families Chaetomiaceae, Choanephoraceae, Cryptococcaceae, Cunninghamellaceae, Dematiaceae, Dipodascaceae, Moniliaceae, Mortierellaceae, Mucoraceae, Pythiaceae, Saccharomycetaceae, Saprolegniaceae, Schizosaccharomycetaceae, Sordariaceae, Sporobolomycetaceae Tuberculariaceae, Adelotheciaceae, Dinophyceae, Ditrichaceae or Prasinophyceae, or a fungus selected from the families Tremellaceae, Filobasidiaceae, Christianseniaceae, Cystofilobasidiaceae, Sordariaceae, Annulatascaceae, Cephalothecaceae, Chaetomiaceae, Coniochaetaceae, Lasiosphaeriaceae, Pleurotremataceae, Elaphomycetaceae, Trichocomaceae, Mucoraceae, Schizophyllaceae, Onygenaceae, Suillaceae, Hypocreaceae, Ustilaginaceae, Trichocomaceae, Phyllachoraceae, Erysiphaceae or a prokaryotic organism, for example a bacterium or blue alga, in particular a bacterium from the families Actinomycetaceae, Bacillaceae, Brevibacteriaceae, Corynebacteriaceae, Cyanophyceae, Enterobacteriaceae, Gordoniaceae, Nocardiaceae, Micrococcaceae, Mycobacteriaceae, Pseudomonaceae, Rhizobiaceae or Streptomycetaceae, this microorganism is grown on a solid or in a liquid medium which is known to the skilled worker and suits the organism. After the growing phase, the organisms can be harvested.

[0090.0.0.0] The microorganisms or the recovered, and if desired isolated, fine chemical can then be processed further directly into foodstuffs or animal feeds or for other applications, for example according to the disclosures made in EP-B-0 533 039 or EP-A-0 615 693, which are expressly incorporated herein by reference. The fermentation broth or fermentation products can be purified in the customary manner by extraction and precipitation or via ion exchangers and other methods known to the person skilled in the art and described herein below. Products of these different work-up procedures are fine chemical e.g. amino acids or amino acid compositions which still comprise fermentation broth and cell components in different amounts, advantageously in the range of from 0 to 99% by weight, preferably below 80% by

weight, especially preferably between below 50%, 40%, 30%, 20%, 10% or 5% by weight.

- [0091.0.0.0] Preferred microorganisms are selected from the group consisting of Chaetomiaceae such as the genera *Chaetomium* e.g. the species *Chaetomidium fimeti*; Choanephoraceae such as the genera *Blakeslea*, *Choanephora* e.g. the species *Blakeslea trispora*, *Choanephora cucurbitarum* or *Choanephora infundibulifera* var. *cucurbitarum*; Cryptococcaceae such as the genera *Candida*, *Cryptococcus*, *Rhodotorula*, *Torulopsis* e.g. the species *Candida albicans*, *Candida albomarginata*, *Candida antarctica*, *Candida bacarum*, *Candida bogoriensis*, *Candida boidinii*, *Candida bovina*, *Candida brumptii*, *Candida cacaoi*, *Candida cariosilignicola*, *Candida catenulata*, *Candida chalmersii*, *Candida ciferrii*, *Candida cylindracea*, *Candida edax*, *Candida ernobii*, *Candida famata*, *Candida freyschussii*, *Candida friedrichii*, *Candida glabrata*, *Candida guilliermondii*, *Candida haemulonii*, *Candida humicola*, *Candida inconspicua*, *Candida ingens*, *Candida intermedia*, *Candida kefyr*, *Candida krusei*, *Candida lactiscondensi*, *Candida lambica*, *Candida lipolytica*, *Candida lusitanae*, *Candida macedoniensis*, *Candida magnoliae*, *Candida membranaefaciens*, *Candida mesenterica*, *Candida multigemmis*, *Candida mycoderma*, *Candida nemodendra*, *Candida nitratophila*, *Candida norvegensis*, *Candida norvegica*, *Candida parapsilosis*, *Candida pelliculosa*, *Candida peltata*, *Candida pini*, *Candida pseudotropicalis*, *Candida pulcherrima*, *Candida punicea*, *Candida pustula*, *Candida ravautii*, *Candida reukauffii*, *Candida rugosa*, *Candida sake*, *Candida silvicola*, *Candida solani*, *Candida sp.*, *Candida spandovensis*, *Candida succiphila*, *Candida tropicalis*, *Candida utilis*, *Candida valida*, *Candida versatilis*, *Candida vini*, *Candida zeylanoides*, *Cryptococcus albidus*, *Cryptococcus curvatus*, *Cryptococcus flavus*, *Cryptococcus humicola*, *Cryptococcus hungaricus*, *Cryptococcus kuetzingii*, *Cryptococcus laurentii*, *Cryptococcus macerans*, *Cryptococcus neoformans*, *Cryptococcus terreus*, *Cryptococcus uniguttulatus*, *Rhodotorula acheniorum*, *Rhodotorula bacarum*, *Rhodotorula bogoriensis*, *Rhodotorula flava*, *Rhodotorula glutinis*, *Rhodotorula macerans*, *Rhodotorula minuta*, *Rhodotorula mucilaginosa*, *Rhodotorula pilimanae*, *Rhodotorula pustula*, *Rhodotorula rubra*, *Rhodotorula tokyoensis*, *Torulopsis colliculosa*, *Torulopsis dattila* or *Torulopsis neoformans*; Cunninghamellaceae such as the genera *Cunninghamella* e.g. the species *Cunninghamella blakesleeana*, *Cunninghamella echinulata*, *Cunninghamella echinulata* var. *elegans*, *Cunninghamella elegans* or *Cunninghamella homothallica*; Dematiaceae such as the genera *Alternaria*, *Bipolaris*, *Cercospora*, *Chalara*, *Cladosporium*, *Curvularia*, *Exophiala*, *Helicosporium*, *Helminthosporium*, *Orbomyces*, *Philalophora*, *Pithomyces*, *Spilocaea*, *Thielaviopsis*, *Wangiella* e.g. the species *Curvularia affinis*, *Curvularia clavata*, *Curvularia fallax*, *Curvularia inaequalis*, *Curvularia indica*, *Curvularia lunata*, *Curvularia pallescens*, *Curvularia verruculosa* or *Helminthosporium sp.*; Moniliaceae such as the genera *Arthrotrichum*, *Aspergillus*, *Epidermophyton*, *Geotrichum*, *Gliocladium*, *Histoplasma*, *Microsporum*, *Monilia*, *Oedocephalum*, *Oidium*, *Penicillium*, *Trichoderma*, *Trichophyton*, *Trichotecium*,

Verticillium e.g. the species *Aspergillus aculeatus*, *Aspergillus albus*, *Aspergillus alliaceus*, *Aspergillus asperescens*, *Aspergillus awamori*, *Aspergillus candidus*, *Aspergillus carbonarius*, *Aspergillus carneus*, *Aspergillus chevalieri*, *Aspergillus chevalieri* var. *intermedius*, *Aspergillus clavatus*, *Aspergillus ficuum*, *Aspergillus*
 5 *flavipes*, *Aspergillus flavus*, *Aspergillus foetidus*, *Aspergillus fumigatus*, *Aspergillus giganteus*, *Aspergillus humicola*, *Aspergillus intermedius*, *Aspergillus japonicus*, *Aspergillus nidulans*, *Aspergillus niger*, *Aspergillus niveus*, *Aspergillus ochraceus*, *Aspergillus oryzae*, *Aspergillus ostianus*, *Aspergillus parasiticus*, *Aspergillus parasiticus*
 10 var. *globosus*, *Aspergillus penicillioides*, *Aspergillus phoenicis*, *Aspergillus rugulosus*, *Aspergillus sclerotiorum*, *Aspergillus sojae* var. *gymnosardae*, *Aspergillus sydowi*, *Aspergillus tamarii*, *Aspergillus terreus*, *Aspergillus terricola*, *Aspergillus toxicarius*, *Aspergillus unguis*, *Aspergillus ustus*, *Aspergillus versicolor*, *Aspergillus vitricolae*, *Aspergillus wentii*, *Penicillium adametzi*, *Penicillium albicans*, *Penicillium arabicum*, *Penicillium arenicola*, *Penicillium argillaceum*, *Penicillium arvense*, *Penicillium*
 15 *asperosporum*, *Penicillium aurantiogriseum*, *Penicillium avellaneum*, *Penicillium baarnense*, *Penicillium bacillisporum*, *Penicillium brasilianum*, *Penicillium brevicompactum*, *Penicillium camemberti*, *Penicillium canadense*, *Penicillium canescens*, *Penicillium caperatum*, *Penicillium capsulatum*, *Penicillium caseicolum*, *Penicillium chrysogenum*, *Penicillium citreonigrum*, *Penicillium*
 20 *citrinum*, *Penicillium claviforme*, *Penicillium commune*, *Penicillium corylophilum*, *Penicillium corymbiferum*, *Penicillium crustosum*, *Penicillium cyclopium*, *Penicillium daleae*, *Penicillium decumbens*, *Penicillium dierckxii*, *Penicillium digitatum*, *Penicillium digitatum* var. *latum*, *Penicillium divaricatum*, *Penicillium diversum*, *Penicillium duclauxii*, *Penicillium echinosporum*, *Penicillium*
 25 *expansum*, *Penicillium fellutanum*, *Penicillium frequentans*, *Penicillium funiculosum*, *Penicillium glabrum*, *Penicillium gladioli*, *Penicillium griseofulvum*, *Penicillium hirsutum*, *Penicillium hispanicum*, *Penicillium islandicum*, *Penicillium italicum*, *Penicillium italicum* var. *avellaneum*, *Penicillium janczewskii*, *Penicillium janthinellum*, *Penicillium japonicum*, *Penicillium*
 30 *lavendulum*, *Penicillium lilacinum*, *Penicillium lividum*, *Penicillium martensii*, *Penicillium megasporum*, *Penicillium miczynskii*, *Penicillium nalgiovense*, *Penicillium nigricans*, *Penicillium notatum*, *Penicillium ochrochloron*, *Penicillium odoratum*, *Penicillium oxalicum*, *Penicillium paraherquei*, *Penicillium patulum*, *Penicillium pinophilum*, *Penicillium piscarium*, *Penicillium*
 35 *pseudostromaticum*, *Penicillium puberulum*, *Penicillium purpurogenum*, *Penicillium raciborskii*, *Penicillium roqueforti*, *Penicillium rotundum*, *Penicillium rubrum*, *Penicillium sacculum*, *Penicillium simplicissimum*, *Penicillium sp.*, *Penicillium spinulosum*, *Penicillium steckii*, *Penicillium stoloniferum*, *Penicillium striatisporum*, *Penicillium striatum*, *Penicillium tardum*, *Penicillium thomii*, *Penicillium turbatum*, *Penicillium*
 40 *variable*, *Penicillium vermiculatum*, *Penicillium vermoesenii*, *Penicillium verrucosum*, *Penicillium verrucosum* var. *corymbiferum*, *Penicillium verrucosum* var. *cyclopium*, *Penicillium verruculosum*, *Penicillium vinaceum*, *Penicillium violaceum*, *Penicillium*

- viridicatum*, *Penicillium vulpinum*, *Trichoderma hamatum*, *Trichoderma harzianum*,
Trichoderma koningii, *Trichoderma longibrachiatum*, *Trichoderma polysporum*,
Trichoderma reesei, *Trichoderma virens* or *Trichoderma viride*; Mortierellaceae such as
the genera *Mortierella* e.g. the species *Mortierella isabellina*, *Mortierella polycephala*,
5 *Mortierella ramanniana*, *Mortierella vinacea* or *Mortierella zonata*; Mucoraceae such as
the genera *Actinomucor*, *Mucor*, *Phycomyces*, *Rhizopus*, *Zygorhynchus* e.g. the
species *Mucor amphibiorum*, *Mucor circinelloides* f. *circinelloides*, *Mucor circinelloides*
var. *griseocyanus*, *Mucor flavus*, *Mucor fuscus*, *Mucor griseocyanus*, *Mucor*
heterosporus, *Mucor hiemalis*, *Mucor hiemalis* f. *hiemalis*, *Mucor inaequisporus*, *Mucor*
10 *indicus*, *Mucor javanicus*, *Mucor mucedo*, *Mucor mucilagineus*, *Mucor piriformis*, *Mucor*
plasmaticus, *Mucor plumbeus*, *Mucor racemosus*, *Mucor racemosus* f. *racemosus*,
Mucor racemosus f. *sphaerosporus*, *Mucor rouxianus*, *Mucor rouxii*, *Mucor sinensis*,
Mucor sp., *Mucor spinosus*, *Mucor tuberculisporus*, *Mucor variisporus*, *Mucor*
variosporus, *Mucor wosnessenskii*, *Phycomyces blakesleeana*, *Rhizopus*
15 *achlamydosporus*, *Rhizopus arrhizus*, *Rhizopus chinensis*, *Rhizopus delemar*,
Rhizopus formosaensis, *Rhizopus japonicus*, *Rhizopus javanicus*, *Rhizopus*
microsporus, *Rhizopus microsporus* var. *chinensis*, *Rhizopus microsporus* var.
oligosporus, *Rhizopus microsporus* var. *rhizopodiformis*, *Rhizopus nigricans*, *Rhizopus*
niveus, *Rhizopus oligosporus*, *Rhizopus oryzae*, *Rhizopus pygmaeus*, *Rhizopus*
20 *rhizopodiformis*, *Rhizopus semarangensis*, *Rhizopus sontii*, *Rhizopus stolonifer*,
Rhizopus thermosus, *Rhizopus tonkinensis*, *Rhizopus tritici* or *Rhizopus usarii*;
Pythiaceae such as the genera *Phytium*, *Phytophthora* e.g. the species *Pythium*
debaryanum, *Pythium intermedium*, *Pythium irregulare*, *Pythium megalacanthum*,
Pythium paroecandrum, *Pythium sylvaticum*, *Pythium ultimum*, *Phytophthora cactorum*,
25 *Phytophthora cinnamomi*, *Phytophthora citricola*, *Phytophthora citrophthora*,
Phytophthora cryptogea, *Phytophthora drechsleri*, *Phytophthora erythroseptica*,
Phytophthora lateralis, *Phytophthora megasperma*, *Phytophthora nicotianae*,
Phytophthora nicotianae var. *parasitica*, *Phytophthora palmivora*, *Phytophthora*
parasitica or *Phytophthora syringae*; Saccharomycetaceae such as the genera
30 *Hansenula*, *Pichia*, *Saccharomyces*, *Saccharomycodes*, *Yarrowia* e.g. the species
Hansenula anomala, *Hansenula californica*, *Hansenula canadensis*, *Hansenula*
capsulata, *Hansenula ciferrii*, *Hansenula glucozyma*, *Hansenula henricii*, *Hansenula*
holstii, *Hansenula minuta*, *Hansenula nonfermentans*, *Hansenula philodendri*,
Hansenula polymorpha, *Hansenula saturnus*, *Hansenula subpelliculosa*, *Hansenula*
35 *wickerhamii*, *Hansenula wingei*, *Pichia alcoholophila*, *Pichia angusta*, *Pichia anomala*,
Pichia bisporea, *Pichia burtonii*, *Pichia canadensis*, *Pichia capsulata*, *Pichia carsonii*,
Pichia cellobiosa, *Pichia ciferrii*, *Pichia farinosa*, *Pichia fermentans*, *Pichia finlandica*,
Pichia glucozyma, *Pichia guilliermondii*, *Pichia haplophila*, *Pichia henricii*, *Pichia holstii*,
Pichia jadinii, *Pichia lindnerii*, *Pichia membranaefaciens*, *Pichia methanolica*, *Pichia*
40 *minuta* var. *minuta*, *Pichia minuta* var. *nonfermentans*, *Pichia norvegensis*, *Pichia*
ohmeri, *Pichia pastoris*, *Pichia philodendri*, *Pichia pini*, *Pichia polymorpha*, *Pichia*
quercuum, *Pichia rhodanensis*, *Pichia sargentensis*, *Pichia stipitis*, *Pichia*

- strasburgensis, *Pichia subpelliculosa*, *Pichia toletana*, *Pichia trehalophila*, *Pichia vini*, *Pichia xylosa*, *Saccharomyces aceti*, *Saccharomyces baillii*, *Saccharomyces bayanus*, *Saccharomyces bisporus*, *Saccharomyces capensis*, *Saccharomyces carlsbergensis*, *Saccharomyces cerevisiae*, *Saccharomyces cerevisiae* var. *ellipsoideus*,
- 5 *Saccharomyces chevalieri*, *Saccharomyces delbrueckii*, *Saccharomyces diastaticus*, *Saccharomyces drosophilum*, *Saccharomyces elegans*, *Saccharomyces ellipsoideus*, *Saccharomyces fermentati*, *Saccharomyces florentinus*, *Saccharomyces fragilis*, *Saccharomyces heterogenicus*, *Saccharomyces hienipiensis*, *Saccharomyces inusitatus*, *Saccharomyces italicus*, *Saccharomyces kluyveri*, *Saccharomyces krusei*,
- 10 *Saccharomyces lactis*, *Saccharomyces marxianus*, *Saccharomyces microellipsoides*, *Saccharomyces montanus*, *Saccharomyces norbensis*, *Saccharomyces oleaceus*, *Saccharomyces paradoxus*, *Saccharomyces pastorianus*, *Saccharomyces pretoriensis*, *Saccharomyces rosei*, *Saccharomyces rouxii*, *Saccharomyces uvarum*, *Saccharomycodes ludwigii* or *Yarrowia lipolytica*; Saprolegniaceae such as the genera
- 15 *Saprolegnia* e.g. the species *Saprolegnia ferax*; Schizosaccharomycetaceae such as the genera *Schizosaccharomyces* e.g. the species *Schizosaccharomyces japonicus* var. *japonicus*, *Schizosaccharomyces japonicus* var. *versatilis*, *Schizosaccharomyces malidevorans*, *Schizosaccharomyces octosporus*, *Schizosaccharomyces pombe* var. *malidevorans* or *Schizosaccharomyces pombe* var. *pombe*; Sodariaceae such as the
- 20 genera *Neurospora*, *Sordaria* e.g. the species *Neurospora africana*, *Neurospora crassa*, *Neurospora intermedia*, *Neurospora sitophila*, *Neurospora tetrasperma*, *Sordaria fimicola* or *Sordaria macrospora*; Tuberculariaceae such as the genera *Epicoccum*, *Fusarium*, *Myrothecium*, *Sphacelia*, *Starkeyomyces*, *Tubercularia* e.g. the species *Fusarium acuminatum*, *Fusarium anthophilum*, *Fusarium aquaeductum*,
- 25 *Fusarium aquaeductum* var. *medium*, *Fusarium avenaceum*, *Fusarium buharicum*, *Fusarium camptoceras*, *Fusarium cerealis*, *Fusarium chlamydosporum*, *Fusarium ciliatum*, *Fusarium coccophilum*, *Fusarium coeruleum*, *Fusarium concolor*, *Fusarium crookwellense*, *Fusarium culmorum*, *Fusarium dimerum*, *Fusarium diversisporum*, *Fusarium equiseti*, *Fusarium equiseti* var. *bullatum*, *Fusarium eumartii*, *Fusarium flocciferum*, *Fusarium fujikuroi*, *Fusarium graminearum*, *Fusarium graminum*, *Fusarium heterosporum*, *Fusarium incarnatum*, *Fusarium inflexum*, *Fusarium javanicum*, *Fusarium lateritium*, *Fusarium lateritium* var. *majus*, *Fusarium longipes*, *Fusarium melanochlorum*, *Fusarium merismoides*, *Fusarium merismoides* var. *chlamydosporale*, *Fusarium moniliforme*, *Fusarium moniliforme* var. *anthophilum*, *Fusarium moniliforme*
- 35 var. *subglutinans*, *Fusarium nivale*, *Fusarium nivale* var. *majus*, *Fusarium oxysporum*, *Fusarium oxysporum* f. sp. *aechmeae*, *Fusarium oxysporum* f. sp. *cepaee*, *Fusarium oxysporum* f. sp. *conglutinans*, *Fusarium oxysporum* f. sp. *cucumerinum*, *Fusarium oxysporum* f. sp. *cyclaminis*, *Fusarium oxysporum* f. sp. *dianthi*, *Fusarium oxysporum* f. sp. *lycopersici*, *Fusarium oxysporum* f. sp. *melonis*, *Fusarium oxysporum* f. sp.
- 40 *passiflorae*, *Fusarium oxysporum* f. sp. *pisi*, *Fusarium oxysporum* f. sp. *tracheiphilum*, *Fusarium oxysporum* f. sp. *tuberosi*, *Fusarium oxysporum* f. sp. *tulipae*, *Fusarium oxysporum* f. sp. *vasinfectum*, *Fusarium pallidroseum*, *Fusarium poae*, *Fusarium*

- proliferatum*, *Fusarium proliferatum* var. *minus*, *Fusarium redolens*, *Fusarium redolens* f. sp. *dianthi*, *Fusarium reticulatum*, *Fusarium roseum*, *Fusarium sacchari* var. *elongatum*, *Fusarium sambucinum*, *Fusarium sambucinum* var. *coeruleum*, *Fusarium semitectum*, *Fusarium semitectum* var. *majus*, *Fusarium solani*, *Fusarium solani* f. sp. *pisi*, *Fusarium sporotrichioides*, *Fusarium sporotrichioides* var. *minus*, *Fusarium subiunatum*, *Fusarium succisae*, *Fusarium sulphureum*, *Fusarium tabacinum*, *Fusarium tricinatum*, *Fusarium udum*, *Fusarium ventricosum*, *Fusarium verticillioides*, *Fusarium xylarioides* or *Fusarium zonatum*; Sporobolomycetaceae such as the genera *Bullera*, *Sporobolomyces*, *Itersonilia* e.g. the species *Sporobolomyces holsaticus*, *Sporobolomyces odorus*, *Sporobolomyces puniceus*, *Sporobolomyces salmonicolor*, *Sporobolomyces singularis* or *Sporobolomyces tsugae*; Adelotheciaceae such as the genera e.g. the species *Physcomitrella patens*; Dinophyceae such as the genera *Crypthecodinium*, *Phaeodactylum* e.g. the species *Crypthecodinium cohnii* or *Phaeodactylum tricornutum*; Ditrichaceae such as the genera *Ceratodon*, *Pleuridium*, *Astomiopsis*, *Ditrichum*, *Philibertiella*, *Ceratodon*, *Distichium*, *Skottsbergia* e.g. the species *Ceratodon antarcticus*, *Ceratodon purpureus*, *Ceratodon purpureus* ssp. *convolutus* or *Ceratodon purpureus* ssp. *stenocarpus*; Prasinophyceae such as the genera *Nephroselmis*, *Prasinococcus*, *Scherffelia*, *Tetraselmis*, *Mantoniella*, *Ostreococcus* e.g. the species *Nephroselmis olivacea*, *Prasinococcus capsulatus*, *Scherffelia dubia*, *Tetraselmis chui*, *Tetraselmis suecica*, *Mantoniella squamata* or *Ostreococcus tauri*; Actinomycetaceae such as the genera *Actinomyces*, *Actinobaculum*, *Arcanobacterium*, *Mobiluncus* e.g. the species *Actinomyces bernardiae*, *Actinomyces bovis*, *Actinomyces bowdenii*, *Actinomyces canis*, *Actinomyces cardiffensis*, *Actinomyces catuli*, *Actinomyces coleocanis*, *Actinomyces denticolens*, *Actinomyces europaeus*, *Actinomyces funkei*, *Actinomyces georgiae*, *Actinomyces gerencseriae*, *Actinomyces hordeovulneris*, *Actinomyces howellii*, *Actinomyces humiferus*, *Actinomyces hyovaginalis*, *Actinomyces israelii*, *Actinomyces marimammalium*, *Actinomyces meyeri*, *Actinomyces naeslundii*, *Actinomyces nasicola*, *Actinomyces neuui* subsp. *anitratus*, *Actinomyces neuui* subsp. *neuui*, *Actinomyces odontolyticus*, *Actinomyces oricola*, *Actinomyces pyogenes*, *Actinomyces radidentis*, *Actinomyces radingae*, *Actinomyces slackii*, *Actinomyces suimastitidis*, *Actinomyces suis*, *Actinomyces turicensis*, *Actinomyces urogenitalis*, *Actinomyces vaccimaxillae*, *Actinomyces viscosus*, *Actinobaculum schaalii*, *Actinobaculum suis*, *Actinobaculum urinale*, *Arcanobacterium bernardiae*, *Arcanobacterium haemolyticum*, *Arcanobacterium hippocoleae*, *Arcanobacterium phocae*, *Arcanobacterium pluranimalium*, *Arcanobacterium pyogenes*, *Mobiluncus curtisii* subsp. *curtisii*, *Mobiluncus curtisii* subsp. *holmesii* or *Mobiluncus mulieris*; Bacillaceae such as the genera *Amphibacillus*, *Anoxybacillus*, *Bacillus*, *Exiguobacterium*, *Gracilibacillus*, *Holobacillus*, *Saccharococcus*, *Salibacillus*, *Virgibacillus* e.g. the species *Amphibacillus fermentum*, *Amphibacillus tropicus*, *Amphibacillus xylanus*, *Anoxybacillus flavithermus*, *Anoxybacillus gonensis*, *Anoxybacillus pushchinoensis*, *Bacillus acidocaldarius*, *Bacillus acidoterrestris*, *Bacillus aeolius*, *Bacillus agaradhaerens*, *Bacillus agri*, *Bacillus*

- alcalophilus*, *Bacillus alginolyticus*, *Bacillus alvei*, *Bacillus amyloliquefaciens*, *Bacillus amylolyticus*, *Bacillus aneurinilyticus*, *Bacillus aquimaris*, *Bacillus arseniciselenatis*,
Bacillus atrophaeus, *Bacillus azotofixans*, *Bacillus azotoformans*, *Bacillus badius*,
5 *Bacillus barbaricus*, *Bacillus benzoovorans*, *Bacillus borstelensis*, *Bacillus brevis*,
Bacillus carboniphilus, *Bacillus centrosporus*, *Bacillus cereus*, *Bacillus chitinolyticus*,
Bacillus chondroitinus, *Bacillus choshinensis*, *Bacillus circulans*, *Bacillus clarkii*,
Bacillus clausii, *Bacillus coagulans*, *Bacillus cohnii*, *Bacillus curdianolyticus*, *Bacillus*
cycloheptanicus, *Bacillus decolorationis*, *Bacillus dipsosauri*, *Bacillus edaphicus*,
Bacillus ehimensis, *Bacillus endophyticus*, *Bacillus fastidiosus*, *Bacillus firmus*, *Bacillus*
10 *flexus*, *Bacillus formosus*, *Bacillus fumarioli*, *Bacillus funiculus*, *Bacillus fusiformis*,
Bacillus sphaericus subsp. *fusiformis*, *Bacillus galactophilus*, *Bacillus globisporus*,
Bacillus globisporus subsp. *marinus*, *Bacillus glucanolyticus*, *Bacillus gordonae*,
Bacillus halmapalus, *Bacillus haloalkaliphilus*, *Bacillus halodenitrificans*, *Bacillus*
halodurans, *Bacillus halophilus*, *Bacillus horikoshii*, *Bacillus horti*, *Bacillus infernos*,
15 *Bacillus insolitus*, *Bacillus jeotgali*, *Bacillus kaustophilus*, *Bacillus kobensis*, *Bacillus*
krulwichiae, *Bacillus laevolacticus*, *Bacillus larvae*, *Bacillus laterosporus*, *Bacillus*
lautus, *Bacillus lentimorbus*, *Bacillus lentus*, *Bacillus licheniformis*, *Bacillus luciferensis*,
Bacillus macerans, *Bacillus macquariensis*, *Bacillus marinus*, *Bacillus marisflavi*,
Bacillus marismortui, *Bacillus megaterium*, *Bacillus methanolicus*, *Bacillus migulanus*,
20 *Bacillus mojaviensis*, *Bacillus mucilaginosus*, *Bacillus mycoides*, *Bacillus naganoensis*,
Bacillus nealsonii, *Bacillus neidei*, *Bacillus niacini*, *Bacillus okuhidensis*, *Bacillus*
oleronius, *Bacillus pabuli*, *Bacillus pallidus*, *Bacillus pantothenicus*, *Bacillus*
parabrevis, *Bacillus pasteurii*, *Bacillus peoriae*, *Bacillus polymyxa*, *Bacillus popilliae*,
Bacillus pseudocaliphilus, *Bacillus pseudofirmus*, *Bacillus pseudomycoides*, *Bacillus*
25 *psychrodurans*, *Bacillus psychrophilus*, *Bacillus psychrosaccharolyticus*, *Bacillus*
psychrotolerans, *Bacillus pulvifaciens*, *Bacillus pumilus*, *Bacillus pycnus*, *Bacillus*
reuszeri, *Bacillus salexigens*, *Bacillus schlegelii*, *Bacillus selenitireducens*, *Bacillus*
silvestris, *Bacillus simplex*, *Bacillus siralis*, *Bacillus smithii*, *Bacillus sonorensis*, *Bacillus*
sphaericus, *Bacillus sporothermodurans*, *Bacillus stearothermophilus*, *Bacillus*
30 *subterraneus*, *Bacillus subtilis* subsp. *spizizenii*, *Bacillus subtilis* subsp. *subtilis*, *Bacillus*
thermantarcticus, *Bacillus thermoaerophilus*, *Bacillus thermoamylovorans*, *Bacillus*
thermoantarcticus, *Bacillus thermocatenulatus*, *Bacillus thermocloacae*, *Bacillus*
thermodenitrificans, *Bacillus thermoglucosidasius*, *Bacillus thermoleovorans*, *Bacillus*
thermoruber, *Bacillus thermosphaericus*, *Bacillus thiaminolyticus*, *Bacillus*
35 *thuringiensis*, *Bacillus tusciae*, *Bacillus validus*, *Bacillus vallismortis*, *Bacillus vedderi*,
Bacillus vulcani, *Bacillus weihenstephanensis*, *Exiguobacterium acetylicum*,
Exiguobacterium antarcticum, *Exiguobacterium aurantiacum*, *Exiguobacterium undae*,
Gracilbacillus dipsosauri, *Gracilbacillus halotolerans*, *Halobacillus halophilus*,
Halobacillus karajensis, *Halobacillus litoralis*, *Halobacillus salinus*, *Halobacillus*
40 *trueperi*, *Saccharococcus caldxylosilyticus*, *Saccharococcus thermophilus*,
Salibacillus marismortui, *Salibacillus salexigens*, *Virgibacillus carmonensis*,
Virgibacillus marismortui, *Virgibacillus necropolis*, *Virgibacillus pantothenicus*,

- Virgibacillus picturae*, *Virgibacillus proomii* or *Virgibacillus salexigens*,
 Brevibacteriaceae such as the genera *Brevibacterium* e.g. the species *Brevibacterium*
acetylicum, *Brevibacterium albidum*, *Brevibacterium ammoniagenes*, *Brevibacterium*
avium, *Brevibacterium casei*, *Brevibacterium citreum*, *Brevibacterium divaricatum*,
 5 *Brevibacterium epidermidis*, *Brevibacterium fermentans*, *Brevibacterium frigoritolerans*,
Brevibacterium halotolerans, *Brevibacterium imperiale*, *Brevibacterium incertum*,
Brevibacterium iodium, *Brevibacterium linens*, *Brevibacterium liquefaciens*,
Brevibacterium lutescens, *Brevibacterium luteum*, *Brevibacterium lyticum*,
Brevibacterium mcbrellneri, *Brevibacterium otitidis*, *Brevibacterium oxydans*,
 10 *Brevibacterium paucivorans*, *Brevibacterium protophormiae*, *Brevibacterium pusillum*,
Brevibacterium saperdae, *Brevibacterium stationis*, *Brevibacterium testaceum* or
Brevibacterium vitaeruminis; Corynebacteriaceae such as the genera *Corynebacterium*
 e.g. the species *Corynebacterium accolens*, *Corynebacterium afermentans* subsp.
afermentans, *Corynebacterium afermentans* subsp. *lipophilum*, *Corynebacterium*
 15 *ammoniagenes*, *Corynebacterium amycolatum*, *Corynebacterium appendicis*,
Corynebacterium aquilae, *Corynebacterium argentoratense*, *Corynebacterium*
atypicum, *Corynebacterium aurimucosum*, *Corynebacterium auris*, *Corynebacterium*
auriscanis, *Corynebacterium betae*, *Corynebacterium beticola*, *Corynebacterium bovis*,
Corynebacterium callunae, *Corynebacterium camporealensis*, *Corynebacterium*
 20 *capitovis*, *Corynebacterium casei*, *Corynebacterium confusum*, *Corynebacterium*
coyleae, *Corynebacterium cystitidis*, *Corynebacterium durum*, *Corynebacterium*
efficiens, *Corynebacterium equi*, *Corynebacterium falsenii*, *Corynebacterium fascians*,
Corynebacterium felinum, *Corynebacterium flaccumfaciens*, *Corynebacterium*
flavescens, *Corynebacterium freneyi*, *Corynebacterium glaucum*, *Corynebacterium*
 25 *glucuronolyticum*, *Corynebacterium glutamicum*, *Corynebacterium hoagii*,
Corynebacterium ilicis, *Corynebacterium imitans*, *Corynebacterium insidiosum*,
Corynebacterium iranicum, *Corynebacterium jeikeium*, *Corynebacterium*
kroppenstedtii, *Corynebacterium kutscheri*, *Corynebacterium lilium*, *Corynebacterium*
lipophiloflavum, *Corynebacterium macginleyi*, *Corynebacterium mastitidis*,
 30 *Corynebacterium matruchotii*, *Corynebacterium michiganense*, *Corynebacterium*
michiganense subsp. *tessellarius*, *Corynebacterium minutissimum*, *Corynebacterium*
mooreparkense, *Corynebacterium mucifaciens*, *Corynebacterium mycetoides*,
Corynebacterium nebraskense, *Corynebacterium oortii*, *Corynebacterium*
paurometabolum, *Corynebacterium phocae*, *Corynebacterium pilosum*,
 35 *Corynebacterium poinsettiae*, *Corynebacterium propinquum*, *Corynebacterium*
pseudodiphtheriticum, *Corynebacterium pseudotuberculosis*, *Corynebacterium*
pyogenes, *Corynebacterium rathayi*, *Corynebacterium renale*, *Corynebacterium riegellii*,
Corynebacterium seminale, *Corynebacterium sepedonicum*, *Corynebacterium*
simulans, *Corynebacterium singulare*, *Corynebacterium sphenisci*, *Corynebacterium*
 40 *spheniscorum*, *Corynebacterium striatum*, *Corynebacterium suicordis*,
Corynebacterium sundsvallense, *Corynebacterium terpenotabidum*, *Corynebacterium*
testudinoris, *Corynebacterium thomssenii*, *Corynebacterium tritici*, *Corynebacterium*

- ulcerans*, *Corynebacterium urealyticum*, *Corynebacterium variabile*, *Corynebacterium vitaeruminis* or *Corynebacterium xerosis*; Enterobacteriaceae such as the genera *Alterococcus*, *Arsenophonus*, *Brenneria*, *Buchnera*, *Budvicia*, *Buttiauxella*, *Calymmatobacterium*, *Cedecea*, *Citrobacter*, *Edwardsiella*, *Enterobacter*, *Erwinia*,
5 *Escherichia*, *Ewingella*, *Hafnia*, *Klebsiella*, *Kluyvera*, *Leclercia*, *Leminorella*,
Moellerella, *Morganella*, *Obesumbacterium*, *Pantoea*, *Pectobacterium*, *Photorhabdus*,
Plesiomonas, *Pragia*, *Proteus*, *Providencia*, *Rahnella*, *Saccharobacter*, *Salmonella*,
Shigella, *Serratia*, *Sodalis*, *Tatumella*, *Trabulsiella*, *Wigglesworthia*,
Xenorhabdus, *Yersinia* and *Yokenella* e.g. the species *Arsenophonus nasoniae*,
10 *Brenneria alni*, *Brenneria nigrifluens*, *Brenneria quercina*, *Brenneria rubrifaciens*,
Brenneria salicis, *Budvicia aquatica*, *Buttiauxella agrestis*, *Buttiauxella brennerae*,
Buttiauxella ferragutiae, *Buttiauxella gaviniae*, *Buttiauxella izardii*, *Buttiauxella*
noackiae, *Buttiauxella warmboldiae*, *Cedecea davisae*, *Cedecea lapagei*, *Cedecea*
netteri, *Citrobacter amalonaticus*, *Citrobacter diversus*, *Citrobacter freundii*, *Citrobacter*
15 *genomospecies*, *Citrobacter gillenii*, *Citrobacter intermedium*, *Citrobacter koseri*,
Citrobacter murlinae, *Citrobacter sp.*, *Edwardsiella hoshinae*, *Edwardsiella ictaluri*,
Edwardsiella tarda, *Erwinia alni*, *Erwinia amylovora*, *Erwinia ananatis*, *Erwinia*
aphidicola, *Erwinia billingiae*, *Erwinia cacticida*, *Erwinia cancerogena*, *Erwinia*
carnegieana, *Erwinia carotovora* subsp. *atroseptica*, *Erwinia carotovora* subsp.
20 *betavasculorum*, *Erwinia carotovora* subsp. *odorifera*, *Erwinia carotovora* subsp.
wasabiae, *Erwinia chrysanthemi*, *Erwinia cypripedii*, *Erwinia dissolvens*, *Erwinia*
herbicola, *Erwinia mallotivora*, *Erwinia milletiae*, *Erwinia nigrifluens*, *Erwinia*
nimipressuralis, *Erwinia persicina*, *Erwinia psidii*, *Erwinia pyrifoliae*, *Erwinia quercina*,
Erwinia rhapontici, *Erwinia rubrifaciens*, *Erwinia salicis*, *Erwinia stewartii*, *Erwinia*
25 *tracheiphila*, *Erwinia uredovora*, *Escherichia adecarboxylata*, *Escherichia anindolica*,
Escherichia aurescens, *Escherichia blattae*, *Escherichia coli*, *Escherichia coli* var.
communior, *Escherichia coli-mutabile*, *Escherichia fergusonii*, *Escherichia hermannii*,
Escherichia sp., *Escherichia vulneris*, *Ewingella americana*, *Hafnia alvei*, *Klebsiella*
aerogenes, *Klebsiella edwardsii* subsp. *atlantae*, *Klebsiella ornithinolytica*, *Klebsiella*
30 *oxytoca*, *Klebsiella planticola*, *Klebsiella pneumoniae*, *Klebsiella pneumoniae* subsp.
pneumoniae, *Klebsiella sp.*, *Klebsiella terrigena*, *Klebsiella trevisanii*, *Kluyvera*
ascorbata, *Kluyvera citrophila*, *Kluyvera cochleae*, *Kluyvera cryocrescens*, *Kluyvera*
georgiana, *Kluyvera noncitrophila*, *Kluyvera sp.*, *Leclercia adecarboxylata*, *Leminorella*
grimontii, *Leminorella richardii*, *Moellerella wisconsensis*, *Morganella morganii*,
35 *Morganella morganii* subsp. *morganii*, *Morganella morganii* subsp. *sibonii*,
Obesumbacterium proteus, *Pantoea agglomerans*, *Pantoea ananatis*, *Pantoea citrea*,
Pantoea dispersa, *Pantoea punctata*, *Pantoea stewartii* subsp. *stewartii*, *Pantoea*
terrea, *Pectobacterium atrosepticum*, *Pectobacterium carotovorum* subsp.
atrosepticum, *Pectobacterium carotovorum* subsp. *carotovorum*, *Pectobacterium*
40 *chrysanthemi*, *Pectobacterium cypripedii*, *Photorhabdus asymbiotica*, *Photorhabdus*
luminescens, *Photorhabdus luminescens* subsp. *akhurstii*, *Photorhabdus luminescens*
subsp. *laumondii*, *Photorhabdus luminescens* subsp. *luminescens*, *Photorhabdus sp.*,

- Photorhabdus temperata*, *Plesiomonas shigelloides*, *Pragia fontium*, *Proteus hauseri*, *Proteus ichthyosmuis*, *Proteus inconstans*, *Proteus mirabilis*, *Proteus morganii*, *Proteus myxofaciens*, *Proteus penneri*, *Proteus rettgeri*, *Proteus shigelloides*, *Proteus vulgaris*, *Providencia alcalifaciens*, *Providencia fredericiana*, *Providencia heimbachae*,
5 *Providencia rettgeri*, *Providencia rustigianii*, *Providencia stuartii*, *Rahnella aquatilis*, *Salmonella abony*, *Salmonella arizonae*, *Salmonella bongori*, *Salmonella choleraesuis* subsp. *arizonae*, *Salmonella choleraesuis* subsp. *bongori*, *Salmonella choleraesuis* subsp. *choleraesuis*, *Salmonella choleraesuis* subsp. *diarizonae*, *Salmonella choleraesuis* subsp. *houtenae*, *Salmonella choleraesuis* subsp. *indica*, *Salmonella choleraesuis* subsp. *salamae*,
10 *Salmonella daressalaam*, *Salmonella enterica* subsp. *houtenae*, *Salmonella enterica* subsp. *salamae*, *Salmonella enteritidis*, *Salmonella gallinarum*, *Salmonella heidelberg*, *Salmonella panama*, *Salmonella senftenberg*, *Salmonella typhimurium*, *Serratia entomophila*, *Serratia ficaria*, *Serratia fonticola*, *Serratia grimesii*, *Serratia liquefaciens*, *Serratia marcescens*, *Serratia marcescens* subsp. *marcescens*,
15 *Serratia marinorubra*, *Serratia odorifera*, *Serratia plymuthensis*, *Serratia plymuthica*, *Serratia proteamaculans*, *Serratia proteamaculans* subsp. *quinovora*, *Serratia quinivorans*, *Serratia rubidaea*, *Shigella boydii*, *Shigella flexneri*, *Shigella paradysenteriae*, *Shigella sonnei*, *Tatumella ptyseos*, *Xenorhabdus beddingii*, *Xenorhabdus bovienii*, *Xenorhabdus luminescens*, *Xenorhabdus nematophila*,
20 *Xenorhabdus nematophila* subsp. *beddingii*, *Xenorhabdus nematophila* subsp. *bovienii*, *Xenorhabdus nematophila* subsp. *poinarii* or *Xenorhabdus poinarii*; *Gordonia* such as the genera *Gordonia*, *Skermania* e.g. the species *Gordonia aichiensis*, *Gordonia alkanivorans*, *Gordonia amarae*, *Gordonia amicalis*, *Gordonia bronchialis*, *Gordonia desulfuricans*, *Gordonia hirsuta*, *Gordonia hydrophobica*, *Gordonia namibiensis*,
25 *Gordonia nitida*, *Gordonia paraffinivorans*, *Gordonia polyisoprenivorans*, *Gordonia rhizosphera*, *Gordonia rubripertincta*, *Gordonia sihwensis*, *Gordonia sinesedis*, *Gordonia sputi*, *Gordonia terrae* or *Gordonia westfalica*; *Micrococcaceae* such as the genera *Micrococcus*, *Arthrobacter*, *Kocuria*, *Nesterenkonia*, *Renibacterium*, *Rothia*, *Stomatococcus* e.g. the species *Micrococcus agilis*, *Micrococcus antarcticus*,
30 *Micrococcus halobius*, *Micrococcus kristinae*, *Micrococcus luteus*, *Micrococcus lylae*, *Micrococcus nishinomiyaensis*, *Micrococcus roseus*, *Micrococcus sedentarius*, *Micrococcus varians*, *Arthrobacter agilis*, *Arthrobacter albus*, *Arthrobacter atrocyaneus*, *Arthrobacter aurescens*, *Arthrobacter chlorophenolicus*, *Arthrobacter citreus*, *Arthrobacter creatinolyticus*, *Arthrobacter crystallopoietes*, *Arthrobacter cummingsii*,
35 *Arthrobacter duodecadis*, *Arthrobacter flavescens*, *Arthrobacter flavus*, *Arthrobacter gandavensis*, *Arthrobacter globiformis*, *Arthrobacter histidinovorans*, *Arthrobacter ilicis*, *Arthrobacter koreensis*, *Arthrobacter luteolus*, *Arthrobacter methylotrophus*, *Arthrobacter mysorens*, *Arthrobacter nasiphocae*, *Arthrobacter nicotianae*, *Arthrobacter nicotinovorans*, *Arthrobacter oxydans*, *Arthrobacter pascens*, *Arthrobacter picolinophilus*,
40 *Arthrobacter polychromogenes*, *Arthrobacter protophormiae*, *Arthrobacter psychrolactophilus*, *Arthrobacter radiotolerans*, *Arthrobacter ramosus*, *Arthrobacter rhombi*, *Arthrobacter roseus*, *Arthrobacter siderocapsulatus*, *Arthrobacter*

simplex, *Arthrobacter sulfonivorans*, *Arthrobacter sulfureus*, *Arthrobacter terregens*,
Arthrobacter tumescens, *Arthrobacter uratoxydans*, *Arthrobacter ureafaciens*,
Arthrobacter variabilis, *Arthrobacter viscosus*, *Arthrobacter woluwensis*, *Kocuria*
erythromyxa, *Kocuria kristinae*, *Kocuria palustris*, *Kocuria polaris*, *Kocuria rhizophila*,
5 *Kocuria rosea*, *Kocuria varians*, *Nesterenkonia halobia*, *Nesterenkonia lacusekhoensis*,
Renibacterium salmoninarum, *Rothia amarae*, *Rothia dentocariosa*, *Rothia*
mucilaginoso, *Rothia nasimurium* or *Stomatococcus mucilaginosus*; *Mycobacteriaceae*
such as the genera *Mycobacterium* e.g. the species *Mycobacterium africanum*,
Mycobacterium agri, *Mycobacterium aichiense*, *Mycobacterium alvei*, *Mycobacterium*
10 *asiaticum*, *Mycobacterium aurum*, *Mycobacterium austroafricanum*, *Mycobacterium*
bohemicum; *Mycobacterium botniense*, *Mycobacterium brumae*, *Mycobacterium*
chelonae subsp. *abscessus*, *Mycobacterium chitae*, *Mycobacterium chlorophenolicum*,
Mycobacterium chubuense, *Mycobacterium confluens*, *Mycobacterium cookii*,
Mycobacterium diernhoferi, *Mycobacterium doricum*, *Mycobacterium duvalii*,
15 *Mycobacterium fallax*, *Mycobacterium farcinogenes*, *Mycobacterium flavescens*,
Mycobacterium frederiksbergense, *Mycobacterium gadium*, *Mycobacterium gilvum*,
Mycobacterium gordonae, *Mycobacterium hassiacum*, *Mycobacterium hiberniae*,
Mycobacterium hodleri, *Mycobacterium holsaticum*, *Mycobacterium komossense*,
Mycobacterium lacus, *Mycobacterium madagascariense*, *Mycobacterium mageritense*,
20 *Mycobacterium montefiorensis*, *Mycobacterium morioakaense*, *Mycobacterium murale*,
Mycobacterium neoaurum, *Mycobacterium nonchromogenicum*, *Mycobacterium*
obuense, *Mycobacterium palustre*, *Mycobacterium parafortuitum*, *Mycobacterium*
peregrinum, *Mycobacterium phlei*, *Mycobacterium pinnipedii*, *Mycobacterium poriferae*,
Mycobacterium pulveris, *Mycobacterium rhodesiae*, *Mycobacterium shottsii*,
25 *Mycobacterium sphagni*, *Mycobacterium terrae*, *Mycobacterium thermoresistibile*,
Mycobacterium tokaiense, *Mycobacterium triviale*, *Mycobacterium tusciae* or
Mycobacterium vanbaalenii; *Nocardiaceae* such as the genera *Nocardia*, *Rhodococcus*
e.g. the species *Nocardia abscessus*, *Nocardia africana*, *Nocardia amarae*, *Nocardia*
asteroides, *Nocardia autotrophica*, *Nocardia beijingensis*, *Nocardia brasiliensis*,
30 *Nocardia brevicatena*, *Nocardia caishijiensis*, *Nocardia calcarea*, *Nocardia carnea*,
Nocardia cellulans, *Nocardia cerradoensis*, *Nocardia coeliaca*, *Nocardia*
corynebacterioides, *Nocardia crassostreae*, *Nocardia cummidelens*, *Nocardia*
cyriacigeorgica, *Nocardia farcinica*, *Nocardia flavorosea*, *Nocardia fluminea*, *Nocardia*
globerula, *Nocardia hydrocarbonoxydans*, *Nocardia ignorata*, *Nocardia mediterranei*,
35 *Nocardia nova*, *Nocardia orientalis*, *Nocardia otitidis-caviarum*, *Nocardia*
otitidiscaviarum, *Nocardia paucivorans*, *Nocardia petroleophila*, *Nocardia pinensis*,
Nocardia pseudobrasiliensis, *Nocardia pseudovaccinii*, *Nocardia puris*, *Nocardia*
restricta, *Nocardia rugosa*, *Nocardia salmonicida*, *Nocardia saturnea*, *Nocardia*
seriolae, *Nocardia soli*, *Nocardia sulphurea*, *Nocardia transvalensis*, *Nocardia*
40 *uniformis*, *Nocardia vaccinii*, *Nocardia veterana* or *Nocardia vinacea*;
Pseudomonaceae such as the genera *Azomonas*, *Azotobacter*, *Cellvibrio*,
Chryseomonas, *Flaviomonas*, *Lampromedia*, *Mesophilobacter*, *Morococcus*, *Oligella*,

Pseudomonas, Rhizobacter, Rugamonas, Serpens, Thermoleophilum, Xylophilus e.g.
 the species *Azomonas agilis*, *Azomonas insignis*, *Azomonas macrocytogenes*,
Azotobacter agilis, *Azotobacter agilis* subsp. *armeniae*, *Azotobacter armeniacus*,
Azotobacter beijerinckii, *Azotobacter chroococcum*, *Azotobacter indicum*, *Azotobacter*
 5 *macrocytogenes*, *Azotobacter miscellum*, *Azotobacter nigricans* subsp. *nigricans*,
Azotobacter paspali, *Azotobacter salinestris*, *Azotobacter* sp., *Azotobacter vinelandii*,
Flavimonas oryzihabitans, *Mesophilobacter marinus*, *Oligella urethralis*, *Pseudomonas*
acidovorans, *Pseudomonas aeruginosa*, *Pseudomonas agarici*, *Pseudomonas*
alcaligenes, *Pseudomonas aminovorans*, *Pseudomonas amygdali*, *Pseudomonas*
 10 *andropogonis*, *Pseudomonas anguilliseptica*, *Pseudomonas antarctica*, *Pseudomonas*
antimicrobica, *Pseudomonas antimycetica*, *Pseudomonas aptata*, *Pseudomonas*
arvilla, *Pseudomonas asplenii*, *Pseudomonas atlantica*, *Pseudomonas atrofaciens*,
Pseudomonas aureofaciens, *Pseudomonas avellanae*, *Pseudomonas azelaica*,
Pseudomonas azotocolligans, *Pseudomonas balearica*, *Pseudomonas barkeri*,
 15 *Pseudomonas bathycetes*, *Pseudomonas beijerinckii*, *Pseudomonas brassicacearum*,
Pseudomonas brenneri, *Pseudomonas butanovora*, *Pseudomonas carboxydoflava*,
Pseudomonas carboxydohydrogena, *Pseudomonas carboxydovorans*, *Pseudomonas*
carrageenovora, *Pseudomonas caryophylli*, *Pseudomonas cepacia*, *Pseudomonas*
chloritidismutans, *Pseudomonas chlororaphis*, *Pseudomonas cichorii*, *Pseudomonas*
 20 *citronellolis*, *Pseudomonas cocovenenans*, *Pseudomonas compransoris*,
Pseudomonas congelans, *Pseudomonas coronafaciens*, *Pseudomonas corrugata*,
Pseudomonas dacunhae, *Pseudomonas delafieldii*, *Pseudomonas delphinii*,
Pseudomonas denitrificans, *Pseudomonas desmolytica*, *Pseudomonas diminuta*,
Pseudomonas doudoroffii, *Pseudomonas echinoides*, *Pseudomonas elongata*,
 25 *Pseudomonas extorquens*, *Pseudomonas extrêmorientalis*, *Pseudomonas facilis*,
Pseudomonas ficuserectae, *Pseudomonas flava*, *Pseudomonas flavescens*,
Pseudomonas fluorescens, *Pseudomonas fragi*, *Pseudomonas frederiksbergensis*,
Pseudomonas fulgida, *Pseudomonas fuscovaginae*, *Pseudomonas gazotropha*,
Pseudomonas gladioli, *Pseudomonas glathei*, *Pseudomonas glumae*, *Pseudomonas*
 30 *graminis*, *Pseudomonas halophila*, *Pseudomonas helianthi*, *Pseudomonas huttiensis*,
Pseudomonas hydrogenothermophila, *Pseudomonas hydrogenovora*, *Pseudomonas*
indica, *Pseudomonas indigofera*, *Pseudomonas iodium*, *Pseudomonas kilonensis*,
Pseudomonas lachrymans, *Pseudomonas lapsa*, *Pseudomonas lemoignei*,
Pseudomonas lemonnieri, *Pseudomonas lundensis*, *Pseudomonas luteola*,
 35 *Pseudomonas maltophilia*, *Pseudomonas marginalis*, *Pseudomonas marginata*,
Pseudomonas marina, *Pseudomonas meliae*, *Pseudomonas mendocina*,
Pseudomonas mesophilica, *Pseudomonas mixta*, *Pseudomonas montellii*,
Pseudomonas morsprunorum, *Pseudomonas multivorans*, *Pseudomonas natriegens*,
Pseudomonas nautica, *Pseudomonas nitroreducens*, *Pseudomonas oleovorans*,
 40 *Pseudomonas oryzihabitans*, *Pseudomonas ovalis*, *Pseudomonas oxalaticus*,
Pseudomonas palleronii, *Pseudomonas paucimobilis*, *Pseudomonas phaseolicola*,
Pseudomonas phenazinium, *Pseudomonas pickettii*, *Pseudomonas pisi*, *Pseudomonas*

- plantarii*, *Pseudomonas plecoglossicida*, *Pseudomonas poae*, *Pseudomonas primulae*,
Pseudomonas proteolytica, *Pseudomonas pseudoalcaligenes*, *Pseudomonas*
pseudoalcaligenes subsp. *konjaci*, *Pseudomonas pseudoalcaligenes* subsp.
pseudoalcaligenes, *Pseudomonas pseudoflava*, *Pseudomonas putida*, *Pseudomonas*
5 *putida* var. *naraensis*, *Pseudomonas putrefaciens*, *Pseudomonas pyrocinia*,
Pseudomonas radiora, *Pseudomonas reptilivora*, *Pseudomonas rhodesiae*,
Pseudomonas rhodos, *Pseudomonas riboflavina*, *Pseudomonas rubescens*,
Pseudomonas rubrisubalbicans, *Pseudomonas ruhlantii*, *Pseudomonas saccharophila*,
Pseudomonas savastanoi, *Pseudomonas savastanoi* pvar. *glycinea*, *Pseudomonas*
10 *savastanoi* pvar. *phaseolicola*, *Pseudomonas solanacearum*, *Pseudomonas* sp.,
Pseudomonas spinosa, *Pseudomonas stanieri*, *Pseudomonas stutzeri*, *Pseudomonas*
syringae, *Pseudomonas syringae* pvar. *aptata*, *Pseudomonas syringae* pvar.
atrofaciens, *Pseudomonas syringae* pvar. *coronafaciens*, *Pseudomonas syringae* pvar.
delphinii, *Pseudomonas syringae* pvar. *glycinea*, *Pseudomonas syringae* pvar.
15 *helianthi*, *Pseudomonas syringae* pvar. *lachrymans*, *Pseudomonas syringae* pvar.
lapsa, *Pseudomonas syringae* pvar. *morsprunorum*, *Pseudomonas syringae* pvar.
phaseolicola, *Pseudomonas syringae* pvar. *primulae*, *Pseudomonas syringae* pvar.
syringae, *Pseudomonas syringae* pvar. *tabaci*, *Pseudomonas syringae* pvar. *tomato*,
Pseudomonas syringae subsp. *glycinea*, *Pseudomonas syringae* subsp. *savastanoi*,
20 *Pseudomonas syringae* subsp. *syringae*, *Pseudomonas syzygii*, *Pseudomonas tabaci*,
Pseudomonas taeniospiralis, *Pseudomonas testosteroni*, *Pseudomonas*
thermocarboxydovorans, *Pseudomonas thermotolerans*, *Pseudomonas thivervalensis*,
Pseudomonas tomato, *Pseudomonas trivialis*, *Pseudomonas veronii*, *Pseudomonas*
vesicularis, *Pseudomonas viridiflava*, *Pseudomonas viscogena*, *Pseudomonas woodsii*,
25 *Rhizobacter dauci*, *Rhizobacter daucus* or *Xylophilus ampelinus*; Rhizobiaceae such as
the genera *Agrobacterium*, *Carbophilus*, *Chelatobacter*, *Ensifer*, *Rhizobium*,
Sinorhizobium e.g. the species *Agrobacterium atlanticum*, *Agrobacterium ferrugineum*,
Agrobacterium gelatinovorum, *Agrobacterium larrymoorei*, *Agrobacterium meteori*,
Agrobacterium radiobacter, *Agrobacterium rhizogenes*, *Agrobacterium rubi*,
30 *Agrobacterium stellulatum*, *Agrobacterium tumefaciens*, *Agrobacterium vitis*,
Carbophilus carboxidus, *Chelatobacter heintzii*, *Ensifer adhaerens*, *Ensifer arboris*,
Ensifer fredii, *Ensifer kostiensis*, *Ensifer kummerowiae*, *Ensifer medicae*, *Ensifer*
meliloti, *Ensifer sahelii*, *Ensifer terangaie*, *Ensifer xinjiangensis*, *Rhizobium ciceri*
Rhizobium etli, *Rhizobium fredii*, *Rhizobium galegae*, *Rhizobium gallicum*, *Rhizobium*
35 *giardinii*, *Rhizobium hainanense*, *Rhizobium huakuii*, *Rhizobium huautlense*, *Rhizobium*
indigoferae, *Rhizobium japonicum*, *Rhizobium leguminosarum*, *Rhizobium loessense*,
Rhizobium loti, *Rhizobium lupini*, *Rhizobium mediterraneum*, *Rhizobium meliloti*,
Rhizobium mongolense, *Rhizobium phaseoli*, *Rhizobium radiobacter*, *Rhizobium*
rhizogenes, *Rhizobium rubi*, *Rhizobium sullae*, *Rhizobium tianshanense*, *Rhizobium*
40 *trifolii*, *Rhizobium tropici*, *Rhizobium undicola*, *Rhizobium vitis*, *Sinorhizobium*
adhaerens, *Sinorhizobium arboris*, *Sinorhizobium fredii*, *Sinorhizobium kostiense*,
Sinorhizobium kummerowiae, *Sinorhizobium medicae*, *Sinorhizobium meliloti*,

Sinorhizobium morelense, *Sinorhizobium saheli* or *Sinorhizobium xinjiangense*;
 Streptomycetaceae such as the genera Kitasatosprora, Streptomyces,
 Streptoverticillium e.g. the species Streptomyces abikoensis, Streptomyces
 aburaviensis, Streptomyces achromogenes subsp. achromogenes, Streptomyces
 5 achromogenes subsp. rubradiris, Streptomyces acidiscabies, Streptomyces acrimycini,
 Streptomyces aculeolatus, Streptomyces afghaniensis, Streptomyces aianosinicus,
 Streptomyces albaduncus, Streptomyces albiaxialis, Streptomyces
 albidochromogenes, Streptomyces albidoflavus, Streptomyces albireticuli,
 Streptomyces albofaciens, Streptomyces alboflavus, Streptomyces albogriseolus,
 10 Streptomyces albolongus, Streptomyces alboniger, Streptomyces albospinus,
 Streptomyces albosporeus subsp. albosporeus, Streptomyces albosporeus subsp.
 labilomyceticus, Streptomyces alboverticillatus, Streptomyces albovinaceus,
 Streptomyces alboviridis, Streptomyces albulus, Streptomyces albus subsp. albus,
 Streptomyces albus subsp. pathocidicus, Streptomyces almquistii, Streptomyces
 15 althioticus, Streptomyces amakusaensis, Streptomyces ambofaciens, Streptomyces
 aminophilus, Streptomyces anandii, Streptomyces anthocyanicus, Streptomyces
 antibioticus, Streptomyces antimycoticus, Streptomyces anulatus, Streptomyces
 arabicus, Streptomyces arduus, Streptomyces arenae, Streptomyces argenteolus,
 Streptomyces armeniacus, Streptomyces asiaticus, Streptomyces asterosporus,
 20 Streptomyces atratus, Streptomyces atroaurantiacus, Streptomyces atroolivaceus,
 Streptomyces atrovirens, Streptomyces aurantiacus, Streptomyces aurantiogriseus,
 Streptomyces aureocirculatus, Streptomyces aureofaciens, Streptomyces aureorectus,
 Streptomyces aureoversilis, Streptomyces aureoverticillatus, Streptomyces aureus,
 Streptomyces avellaneus, Streptomyces avermectinius, Streptomyces avermitilis,
 25 Streptomyces avidinii, Streptomyces azaticus, Streptomyces azureus, Streptomyces
 baarnensis, Streptomyces bacillaris, Streptomyces badius, Streptomyces baldaccii,
 Streptomyces bambergiensis, Streptomyces beijiagensis, Streptomyces bellus,
 Streptomyces bikiniensis, Streptomyces biverticillatus, Streptomyces blastmyceticus,
 Streptomyces bluensis, Streptomyces bobili, Streptomyces bottropensis, Streptomyces
 30 brasiliensis, Streptomyces bungoensis, Streptomyces cacaoi subsp. asoensis,
 Streptomyces cacaoi subsp. cacaoi, Streptomyces caelestis, Streptomyces caeruleus,
 Streptomyces californicus, Streptomyces calvus, Streptomyces canaries, Streptomyces
 candidus, Streptomyces canescens, Streptomyces cangkringensis, Streptomyces
 caniferus, Streptomyces canus, Streptomyces capillispiralis, Streptomyces capoamus,
 35 Streptomyces carpaticus, Streptomyces carpinensis, Streptomyces catenulae,
 Streptomyces caviscabies, Streptomyces cavourensis subsp. cavourensis,
 Streptomyces cavourensis subsp. washingtonensis, Streptomyces cellostaticus,
 Streptomyces celluloflavus, Streptomyces cellulolyticus, Streptomyces
 cellulosae, Streptomyces champavatii, Streptomyces chartreuses, Streptomyces
 40 chattanoogensis, Streptomyces chibaensis, Streptomyces chrestomyceticus,
 Streptomyces chromofuscus, Streptomyces chryseus, Streptomyces chrysomallus
 subsp. chrysomallus, Streptomyces chrysomallus subsp. fumigatus, Streptomyces

cinereorectus, *Streptomyces cinereoruber* subsp. *cinereoruber*, *Streptomyces cinereoruber* subsp. *fructofermentans*, *Streptomyces cinereospinus*, *Streptomyces cinereus*, *Streptomyces cinerochromogenes*, *Streptomyces cinnabarinus*, *Streptomyces cinnamomensis*, *Streptomyces cinnamoneus*, *Streptomyces cinnamoneus* subsp. *albosporus*, *Streptomyces cinnamoneus* subsp. *cinnamoneus*, *Streptomyces cinnamoneus* subsp. *lanosus*, *Streptomyces cinnamoneus* subsp. *sparsus*, *Streptomyces cirratus*, *Streptomyces ciscaucasicus*, *Streptomyces citreofluorescens*, *Streptomyces clavifer*, *Streptomyces clavuligerus*, *Streptomyces cochleatus*, *Streptomyces coelescens*, *Streptomyces coelicoflavus*, *Streptomyces coelicolor*, *Streptomyces coeruleoflavus*, *Streptomyces coeruleofuscus*, *Streptomyces coeruleoprurus*, *Streptomyces coeruleorubidus*, *Streptomyces coerulescens*, *Streptomyces collinus*, *Streptomyces colombiensis*, *Streptomyces corchorusii*, *Streptomyces costaricanus*, *Streptomyces cremeus*, *Streptomyces crystallinus*, *Streptomyces curacoi*, *Streptomyces cuspidosporus*, *Streptomyces cyaneofuscatus*, *Streptomyces cyaneus*, *Streptomyces cyanoalbus*, *Streptomyces cystargineus*, *Streptomyces daghestanicus*, *Streptomyces diastaticus* subsp. *ardesiacus*, *Streptomyces diastaticus* subsp. *diastaticus*, *Streptomyces diastatochromogenes*, *Streptomyces distallicus*, *Streptomyces djakartensis*, *Streptomyces durhamensis*, *Streptomyces echinatus*, *Streptomyces echinoruber*, *Streptomyces ederensis*, *Streptomyces ehimensis*, *Streptomyces endus*, *Streptomyces enissocaesilis*, *Streptomyces erumpens*, *Streptomyces erythraeus*, *Streptomyces erythrogriseus*, *Streptomyces eurocidicus*, *Streptomyces europaeiscabiei*, *Streptomyces eurythermus*, *Streptomyces exfoliates*, *Streptomyces felleus*, *Streptomyces fervens*, *Streptomyces fervens* subsp. *fervens*, *Streptomyces fervens* subsp. *melrosporus*, *Streptomyces filamentosus*, *Streptomyces filipinensis*, *Streptomyces fimbriatus*, *Streptomyces fimicarius*, *Streptomyces finlayi*, *Streptomyces flaveolus*, *Streptomyces flaveus*, *Streptomyces flavidofuscus*, *Streptomyces flavidovirens*, *Streptomyces flaviscleroticus*, *Streptomyces flavofungini*, *Streptomyces flavofuscus*, *Streptomyces flavogriseus*, *Streptomyces flavopersicus*, *Streptomyces flavotricini*, *Streptomyces flavovariabilis*, *Streptomyces flavovirens*, *Streptomyces flavoviridis*, *Streptomyces flocculus*, *Streptomyces floridae*, *Streptomyces fluorescens*, *Streptomyces fradiae*, *Streptomyces fragilis*, *Streptomyces fulvissimus*, *Streptomyces fulvorobeus*, *Streptomyces humanus*, *Streptomyces fumigatiscleroticus*, *Streptomyces galbus*, *Streptomyces galilaeus*, *Streptomyces gancidicus*, *Streptomyces gardneri*, *Streptomyces gelaticus*, *Streptomyces geysiriensis*, *Streptomyces ghanaensis*, *Streptomyces gibsonii*, *Streptomyces glaucescens*, *Streptomyces glaucosporus*, *Streptomyces glaucus*, *Streptomyces globisporus* subsp. *caucasicus*, *Streptomyces globisporus* subsp. *flavofuscus*, *Streptomyces globisporus* subsp. *globisporus*, *Streptomyces globosus*, *Streptomyces glomeratus*, *Streptomyces glomeroaurantiacus*, *Streptomyces gobitricini*, *Streptomyces goshikiensis*, *Streptomyces gougerotii*, *Streptomyces gramineus*, *Streptomyces graminofaciens*, *Streptomyces griseinus*, *Streptomyces griseoaurantiacus*, *Streptomyces griseobrunneus*, *Streptomyces griseocameus*,

- Streptomyces griseochromogenes*, *Streptomyces griseoflavus*, *Streptomyces griseofuscus*, *Streptomyces griseoincarnatus*, *Streptomyces griseoloalbus*,
Streptomyces griseolosporeus, *Streptomyces griseolus*, *Streptomyces griseoluteus*,
5 *Streptomyces griseomycini*, *Streptomyces griseoplanus*, *Streptomyces griseorubens*,
Streptomyces griseoruber, *Streptomyces griseorubiginosus*, *Streptomyces griseosporeus*, *Streptomyces griseostramineus*, *Streptomyces griseovorticillatus*,
Streptomyces griseoviridis, *Streptomyces griseus* subsp. *alpha*, *Streptomyces griseus* subsp. *cretosus*, *Streptomyces griseus* subsp. *griseus*, *Streptomyces griseus* subsp. *solvificiens*, *Streptomyces hachijoensis*, *Streptomyces halstedii*, *Streptomyces*
10 *hawaiiensis*, *Streptomyces heliomycini*, *Streptomyces helveticus*, *Streptomyces herbaricolor*, *Streptomyces hiroshimensis*, *Streptomyces hirsutus*, *Streptomyces humidus*, *Streptomyces humiferus*, *Streptomyces hydrogenans*, *Streptomyces hygrosopicus* subsp. *angustmyceticus*, *Streptomyces hygrosopicus* subsp. *decoyicus*, *Streptomyces hygrosopicus* subsp. *glebosus*, *Streptomyces hygrosopicus*
15 subsp. *hygrosopicus*, *Streptomyces hygrosopicus* subsp. *ossamyceticus*, *Streptomyces iakyrus*, *Streptomyces indiaensis*, *Streptomyces indigoferus*, *Streptomyces indonesiensis*, *Streptomyces intermedius*, *Streptomyces inusitatus*, *Streptomyces ipomoeae*, *Streptomyces janthinus*, *Streptomyces javensis*, *Streptomyces kanamyceticus*, *Streptomyces kashmirensis*, *Streptomyces kasugaensis*,
20 *Streptomyces katrae*, *Streptomyces kentuckensis*, *Streptomyces kifunensis*, *Streptomyces kishiwadensis*, *Streptomyces kunmingensis*, *Streptomyces kurssanovii*, *Streptomyces labedae*, *Streptomyces laceyi*, *Streptomyces ladakanum*, *Streptomyces lanatus*, *Streptomyces lateritius*, *Streptomyces laurentii*, *Streptomyces lavendofoliae*, *Streptomyces lavendulae* subsp. *grasserius*, *Streptomyces lavendulae* subsp. *lavendulae*, *Streptomyces lavenduligriseus*, *Streptomyces lavendulocolor*,
25 *Streptomyces levis*, *Streptomyces libani* subsp. *libani*, *Streptomyces libani* subsp. *rufus*, *Streptomyces lienomycini*, *Streptomyces lilacinus*, *Streptomyces limosus*, *Streptomyces lincolnensis*, *Streptomyces lipmanii*, *Streptomyces litmocidini*, *Streptomyces lomondensis*, *Streptomyces longisporoflavus*, *Streptomyces longispororuber*, *Streptomyces longisporus*, *Streptomyces longwoodensis*,
30 *Streptomyces lucensis*, *Streptomyces luridiscabiei*, *Streptomyces luridus*, *Streptomyces lusitanus*, *Streptomyces luteireticuli*, *Streptomyces luteogriseus*, *Streptomyces luteosporeus*, *Streptomyces luteovorticillatus*, *Streptomyces lydicus*, *Streptomyces macrosporus*, *Streptomyces malachitofuscus*, *Streptomyces malachitospinus*, *Streptomyces malaysiensis*, *Streptomyces mashuensis*,
35 *Streptomyces massasporeus*, *Streptomyces matensis*, *Streptomyces mauvecolor*, *Streptomyces mediocidicus*, *Streptomyces mediolani*, *Streptomyces megasporus*, *Streptomyces melanogenes*, *Streptomyces melanosporofaciens*, *Streptomyces mexicanus*, *Streptomyces michiganensis*, *Streptomyces microflavus*, *Streptomyces minutiscleroticus*, *Streptomyces mirabilis*, *Streptomyces misakiensis*, *Streptomyces misionensis*, *Streptomyces mobaraensis*, *Streptomyces monomycini*, *Streptomyces morookaensis*, *Streptomyces murinus*, *Streptomyces mutabilis*, *Streptomyces*

- mutomycini*, *Streptomyces naganishii*, *Streptomyces narbonensis*, *Streptomyces nashvillensis*, *Streptomyces netropsis*, *Streptomyces neyagawaensis*, *Streptomyces niger*, *Streptomyces nigrescens*, *Streptomyces nigrifaciens*, *Streptomyces nitrosporeus*, *Streptomyces niveiscabiei*, *Streptomyces niveoruber*, *Streptomyces niveus*, *Streptomyces noboritoensis*, *Streptomyces nodosus*, *Streptomyces nogalater*,
 5 *Streptomyces nojiriensis*, *Streptomyces noursei*, *Streptomyces novaecaesareae*, *Streptomyces ochraceiscleroticus*, *Streptomyces odorifer*, *Streptomyces olivaceiscleroticus*, *Streptomyces olivaceoviridis*, *Streptomyces olivaceus*, *Streptomyces olivochromogenes*, *Streptomyces olivomycini*, *Streptomyces olivoreticuli*,
 10 *Streptomyces olivoreticuli* subsp. *cellulophilus*, *Streptomyces olivoreticuli* subsp. *olivoreticuli*, *Streptomyces olivovorticillatus*, *Streptomyces olivoviridis*, *Streptomyces omiyaensis*, *Streptomyces orinoci*, *Streptomyces pactum*, *Streptomyces paracochleatus*, *Streptomyces paradoxus*, *Streptomyces parvisporogenes*, *Streptomyces parvulus*, *Streptomyces parvus*, *Streptomyces peucetius*, *Streptomyces phaeochromogenes*, *Streptomyces phaeofaciens*, *Streptomyces phaeopurpureus*,
 15 *Streptomyces phaeoviridis*, *Streptomyces phosalacineus*, *Streptomyces pilosus*, *Streptomyces platensis*, *Streptomyces plicatus*, *Streptomyces pluricologrescens*, *Streptomyces polychromogenes*, *Streptomyces poonensis*, *Streptomyces praecox*, *Streptomyces prasinopilosus*, *Streptomyces prasinosporus*, *Streptomyces prasinus*,
 20 *Streptomyces prunicolor*, *Streptomyces psammoticus*, *Streptomyces pseudoechinosporeus*, *Streptomyces pseudogriseolus*, *Streptomyces pseudovenezuelae*, *Streptomyces pulveraceus*, *Streptomyces puniceus*, *Streptomyces puniscabiei*, *Streptomyces purpeofuscus*, *Streptomyces purpurascens*, *Streptomyces purpureus*, *Streptomyces purpurogeneiscleroticus*, *Streptomyces racemochromogenes*, *Streptomyces rameus*, *Streptomyces ramulosus*, *Streptomyces ragoonensis*, *Streptomyces recifensis*, *Streptomyces reactiverticillatus*, *Streptomyces reactiviolaceus*, *Streptomyces regensis*, *Streptomyces resistomycificus*, *Streptomyces reticuliscabiei*, *Streptomyces rhizosphaericus*, *Streptomyces rimosus* subsp. *paromomycinus*, *Streptomyces rimosus* subsp. *rimosus*, *Streptomyces rishiriensis*,
 30 *Streptomyces rochei*, *Streptomyces roseiscleroticus*, *Streptomyces roseodiataticus*, *Streptomyces roseoflavus*, *Streptomyces roseofulvus*, *Streptomyces roseolilacinus*, *Streptomyces roseolus*, *Streptomyces roseosporus*, *Streptomyces roseovorticillatus*, *Streptomyces roseoviolaceus*, *Streptomyces roseoviridis*, *Streptomyces rubber*, *Streptomyces rubiginosohelvolus*, *Streptomyces rubiginosus*, *Streptomyces rubrogriseus*, *Streptomyces rutgersensis* subsp. *castelarensis*, *Streptomyces rutgersensis* subsp. *rutgersensis*, *Streptomyces salmonis*, *Streptomyces sampsonii*, *Streptomyces sanglieri*, *Streptomyces sannanensis*, *Streptomyces sapporonensis*, *Streptomyces scabiei*, *Streptomyces sclerotialis*, *Streptomyces scopiformis*, *Streptomyces seoulensis*, *Streptomyces septatus*, *Streptomyces setae*, *Streptomyces setonii*, *Streptomyces showdoensis*, *Streptomyces sindenensis*, *Streptomyces sioyaensis*, *Streptomyces somaliensis*, *Streptomyces sparsogenes*, *Streptomyces spectabilis*, *Streptomyces speibonae*, *Streptomyces speleomycini*, *Streptomyces*

- spheroids, *Streptomyces spinoverrucosus*, *Streptomyces spiralis*, *Streptomyces spiroverticillatus*, *Streptomyces spitsbergensis*, *Streptomyces sporocinereus*, *Streptomyces sporoclivatus*, *Streptomyces spororaveus*, *Streptomyces sporoverrucosus*, *Streptomyces stelliscabiei*, *Streptomyces stramineus*, *Streptomyces subrutilus*, *Streptomyces sulfonofaciens*, *Streptomyces sulphurous*, *Streptomyces syringium*, *Streptomyces tanashiensis*, *Streptomyces tauricus*, *Streptomyces tendae*, *Streptomyces termitum*, *Streptomyces thermoalcalitolerans*, *Streptomyces thermoautotrophicus*, *Streptomyces thermocarboxydovorans*, *Streptomyces thermocarboxydu*, *Streptomyces thermocoprophilus*, *Streptomyces thermodiastaticus*, *Streptomyces thermogriseus*, *Streptomyces thermolineatus*, *Streptomyces thermonitrificans*, *Streptomyces thermospinosisporus*, *Streptomyces thermoviolaceus* subsp. *apingens*, *Streptomyces thermoviolaceus* subsp. *thermoviolaceus*, *Streptomyces thermovulgaris*, *Streptomyces thioluteus*, *Streptomyces torulosus*, *Streptomyces toxytricini*, *Streptomyces tricolor*, *Streptomyces tubercidicus*, *Streptomyces tuius*, *Streptomyces turgidiscabies*, *Streptomyces umbrinus*, *Streptomyces variabilis*, *Streptomyces variegates*, *Streptomyces varsoviensis*, *Streptomyces vastus*, *Streptomyces venezuelae*, *Streptomyces vinaceus*, *Streptomyces vinaceusdrappus*, *Streptomyces violaceochromogenes*, *Streptomyces violaceolatus*, *Streptomyces violaceorectus*, *Streptomyces violaceoruber*, *Streptomyces violaceorubidus*, *Streptomyces violaceus*, *Streptomyces violaceusniger*, *Streptomyces violarus*, *Streptomyces violascens*, *Streptomyces violatus*, *Streptomyces violens*, *Streptomyces virens*, *Streptomyces virginiae*, *Streptomyces viridiflavus*, *Streptomyces viridiviolaceus*, *Streptomyces viridobrunneus*, *Streptomyces viridochromogenes*, *Streptomyces viridodiastaticus*, *Streptomyces viridosporus*, *Streptomyces vitaminophileus*, *Streptomyces vitaminophilus*, *Streptomyces wedmorensis*, *Streptomyces werraensis*, *Streptomyces willmorei*, *Streptomyces xanthochromogenes*, *Streptomyces xanthocidicus*, *Streptomyces xantholiticus*, *Streptomyces xanthophaeus*, *Streptomyces yatensis*, *Streptomyces yerevanensis*, *Streptomyces yogyakartensis*, *Streptomyces yokosukanensis*, *Streptomyces yunnanensis*, *Streptomyces zaomyceticus*, *Streptovercillium abikoense*, *Streptovercillium albireticuli*, *Streptovercillium alboverticillatum*, *Streptovercillium album*, *Streptovercillium arduum*, *Streptovercillium aureoversale*, *Streptovercillium aureoversile*, *Streptovercillium baldaccii*, *Streptovercillium biverticillatum*, *Streptovercillium blastmyceticum*, *Streptovercillium cinnamoneum* subsp. *albosporum*, *Streptomyces cinnamoneus* subsp. *albosporus*, *Streptovercillium cinnamoneum* subsp. *cinnamoneum*, *Streptovercillium cinnamoneum* subsp. *lanosum*, *Streptovercillium cinnamoneum* subsp. *sparsum*, *Streptovercillium distallicum*, *Streptovercillium ehimense*, *Streptovercillium eurocidicum*, *Streptovercillium fervens* subsp. *fervens*, *Streptovercillium fervens* subsp. *melrosporus*, *Streptovercillium flavopersicum*, *Streptovercillium griseocarneum*, *Streptovercillium griseovercillatum*, *Streptovercillium hachijoense*, *Streptovercillium hiroshimense*, *Streptovercillium kashmirens*, *Streptovercillium kentuckense*, *Streptovercillium kishiwadense*,

Streptovercillium ladakanum, *Streptovercillium lavenduligriseum*, *Streptovercillium lilacinum*, *Streptovercillium luteovercillatum*, *Streptovercillium mashuense*, *Streptovercillium mobaraense*, *Streptovercillium morookaense*, *Streptovercillium netropsis*, *Streptovercillium olivomycini*, *Streptomyces olivomycini*, *Streptovercillium olivoreticuli* subsp. *cellulophilum*, *Streptovercillium olivoreticuli* subsp. *olivoreticuli*, *Streptovercillium olivoreticulum*, *Streptovercillium olivoreticulum* subsp. *cellulophilum*, *Streptovercillium olivovercillatum*, *Streptovercillium orinoci*, *Streptovercillium parvisporogenes*, *Streptovercillium parvisporogenum*, *Streptovercillium rectovercillatum*, *Streptovercillium reticulum* subsp. *protomycicum*, *Streptovercillium roseovercillatum*, *Streptovercillium salmonis*, *Streptovercillium sapporonense*, *Streptovercillium septatum*, *Streptovercillium syringium*, *Streptovercillium thioluteum*, *Streptovercillium verticillium* subsp. *quantum*, *Streptovercillium verticillium* subsp. *tsukushiense* or *Streptovercillium viridoflavum*.

[0092.0.0.0] Particular preferred strains are strains selected from the group consisting of Bacillaceae, Brevibacteriaceae, Corynebacteriaceae, Nocardiaceae, Mycobacteriaceae, Streptomycetaceae, Enterobacteriaceae such as *Bacillus circulans*, *Bacillus subtilis*, *Bacillus* sp., *Brevibacterium albidum*, *Brevibacterium album*, *Brevibacterium cerinum*, *Brevibacterium flavum*, *Brevibacterium glutamigenes*, *Brevibacterium iodinum*, *Brevibacterium ketoglutamicum*, *Brevibacterium lactofermentum*, *Brevibacterium linens*, *Brevibacterium roseum*, *Brevibacterium saccharolyticum*, *Brevibacterium* sp., *Corynebacterium acetoacidophilum*, *Corynebacterium acetoglutamicum*, *Corynebacterium ammoniagenes*, *Corynebacterium glutamicum* (= *Micrococcus glutamicum*), *Corynebacterium melassecola*, *Corynebacterium* sp., *Nocardia rhodochrous* (*Rhodococcus rhodochrous*), *Mycobacterium rhodochrous*, *Streptomyces lividans* and *Escherichia coli* especially *Escherichia coli* K12.

[0093.0.0.0] In addition particular preferred strains are strains selected from the group consisting of Cryptococcaceae, Saccharomycetaceae, Schizosaccharomycetaceae such as the genera *Candida*, *Hansenula*, *Pichia*, *Saccharomyces* and *Schizosaccharomyces* preferred are strains selected from the group consisting of the species *Rhodotorula rubra*, *Rhodotorula glutinis*, *Rhodotorula graminis*, *Yarrowia lipolytica*, *Sporobolomyces salmonicolor*, *Sporobolomyces shibatanus*, *Saccharomyces cerevisiae*, *Candida boidinii*, *Candida bombicola*, *Candida cylindracea*, *Candida parapsilosis*, *Candida rugosa*, *Candida tropicalis*, *Pichia methanolica* and *Pichia pastoris* especially *Saccharomyces cerevisiae*.

[0094.0.0.0] Anacardiaceae such as the genera *Pistacia*, *Mangifera*, *Anacardium* e.g. the species *Pistacia vera* [pistachios, Pistazie], *Mangifer indica* [Mango] or *Anacardium occidentale* [Cashew]; Asteraceae such as the genera *Calendula*, *Carthamus*, *Centaurea*, *Cichorium*, *Cynara*, *Helianthus*, *Lactuca*, *Locusta*, *Tagetes*, *Valeriana* e.g. the species *Calendula officinalis* [Marigold], *Carthamus tinctorius* [safflower],

- Centaurea cyanus* [cornflower], *Cichorium intybus* [blue daisy], *Cynara scolymus* [Artichoke], *Helianthus annuus* [sunflower], *Lactuca sativa*, *Lactuca crispera*, *Lactuca esculenta*, *Lactuca scariola* L. ssp. *sativa*, *Lactuca scariola* L. var. *integrata*, *Lactuca scariola* L. var. *integrifolia*, *Lactuca sativa* subsp. *romana*, *Locusta communis*,
5 *Valeriana locusta* [lettuce], *Tagetes lucida*, *Tagetes erecta* or *Tagetes tenuifolia* [Marigold]; Apiaceae such as the genera *Daucus* e.g. the species *Daucus carota* [carrot]; Betulaceae such as the genera *Corylus* e.g. the species *Corylus avellana* or *Corylus colurna* [hazelnut]; Boraginaceae such as the genera *Borago* e.g. the species *Borago officinalis* [borage]; Brassicaceae such as the genera *Brassica*, *Melanosinapis*,
10 *Sinapis*, *Arabidopsis* e.g. the species *Brassica napus*, *Brassica rapa* ssp. [canola, oilseed rape, turnip rape], *Sinapis arvensis* *Brassica juncea*, *Brassica juncea* var. *juncea*, *Brassica juncea* var. *crispifolia*, *Brassica juncea* var. *foliosa*, *Brassica nigra*, *Brassica sinapioides*, *Melanosinapis communis* [mustard], *Brassica oleracea* [fodder beet] or *Arabidopsis thaliana*; Bromeliaceae such as the genera *Anana*, *Bromelia* e.g.
15 the species *Anana comosus*, *Ananas ananas* or *Bromelia comosa* [pineapple]; Caricaceae such as the genera *Carica* e.g. the species *Carica papaya* [papaya]; Cannabaceae such as the genera *Cannabis* e.g. the species *Cannabis sativa* [hemp], Convolvulaceae such as the genera *Ipomea*, *Convolvulus* e.g. the species *Ipomoea batatas*, *Ipomoea pandurata*, *Convolvulus batatas*, *Convolvulus tiliaceus*, *Ipomoea*
20 *fastigiata*, *Ipomoea tiliacea*, *Ipomoea triloba* or *Convolvulus panduratus* [sweet potato, Man of the Earth, wild potato], Chenopodiaceae such as the genera *Beta*, i.e. the species *Beta vulgaris*, *Beta vulgaris* var. *altissima*, *Beta vulgaris* var. *Vulgaris*, *Beta maritima*, *Beta vulgaris* var. *perennis*, *Beta vulgaris* var. *conditiva* or *Beta vulgaris* var. *esculenta* [sugar beet]; Cucurbitaceae such as the genera *Cucurbita* e.g. the species
25 *Cucurbita maxima*, *Cucurbita mixta*, *Cucurbita pepo* or *Cucurbita moschata* [pumpkin, squash]; Elaeagnaceae such as the genera *Elaeagnus* e.g. the species *Olea europaea* [olive]; Ericaceae such as the genera *Kalmia* e.g. the species *Kalmia latifolia*, *Kalmia angustifolia*, *Kalmia microphylla*, *Kalmia polifolia*, *Kalmia occidentalis*, *Cistus chamaerhodendros* or *Kalmia lucida* [American laurel, broad-leaved laurel, calico bush, spoon wood, sheep laurel, alpine laurel, bog laurel, western bog-laurel, swamp-laurel];
30 Euphorbiaceae such as the genera *Manihot*, *Janipha*, *Jatropha*, *Ricinus* e.g. the species *Manihot utilissima*, *Janipha manihot*, *Jatropha manihot*, *Manihot aipil*, *Manihot dulcis*, *Manihot manihot*, *Manihot melanobasis*, *Manihot esculenta* [manihot, arrowroot, tapioca, cassava] or *Ricinus communis* [castor bean, Castor Oil Bush, Castor Oil Plant,
35 *Palma Christi*, *Wonder Tree*]; Fabaceae such as the genera *Pisum*, *Albizia*, *Cathormion*, *Feuillea*, *Inga*, *Pithecolobium*, *Acacia*, *Mimosa*, *Medicago*, *Glycine*, *Dolichos*, *Phaseolus*, *Soja* e.g. the species *Pisum sativum*, *Pisum arvense*, *Pisum humile* [pea], *Albizia berteriana*, *Albizia julibrissin*, *Albizia lebbeck*, *Acacia berteriana*, *Acacia littoralis*, *Albizia berteriana*, *Albizia berteriana*, *Cathormion berteriana*, *Feuillea*
40 *berteriana*, *Inga fragrans*, *Pithecellobium berterianum*, *Pithecellobium fragrans*, *Pithecolobium berterianum*, *Pseudalbizia berteriana*, *Acacia julibrissin*, *Acacia nemu*, *Albizia nemu*, *Feuillea julibrissin*, *Mimosa julibrissin*, *Mimosa speciosa*, *Sericanrda*

- julibrissin*, *Acacia lebbeck*, *Acacia macrophylla*, *Albizia lebbek*, *Feuillea lebbeck*, *Mimosa lebbeck*, *Mimosa speciosa* [bastard logwood, silk tree, East Indian Walnut], *Medicago sativa*, *Medicago falcata*, *Medicago varia* [alfalfa] *Glycine max* *Dolichos soja*, *Glycine gracilis*, *Glycine hispida*, *Phaseolus max*, *Soja hispida* or *Soja max* [soybean];
- 5 Geraniaceae such as the genera *Pelargonium*, *Cocos*, *Oleum* e.g. the species *Cocos nucifera*, *Pelargonium grossularioides* or *Oleum cocois* [coconut]; Gramineae such as the genera *Saccharum* e.g. the species *Saccharum officinarum*; Juglandaceae such as the genera *Juglans*, *Wallia* e.g. the species *Juglans regia*, *Juglans ailanthifolia*, *Juglans sieboldiana*, *Juglans cinerea*, *Wallia cinerea*, *Juglans bixbyi*, *Juglans californica*,
- 10 *Juglans hindsii*, *Juglans intermedia*, *Juglans jamaicensis*, *Juglans major*, *Juglans microcarpa*, *Juglans nigra* or *Wallia nigra* [walnut, black walnut, common walnut, persian walnut, white walnut, butternut, black walnut]; Lauraceae such as the genera *Persea*, *Laurus* e.g. the species laurel *Laurus nobilis* [bay, laurel, bay laurel, sweet bay], *Persea americana* *Persea americana*, *Persea gratissima* or *Persea persea*
- 15 [avocado]; Leguminosae such as the genera *Arachis* e.g. the species *Arachis hypogaea* [peanut]; Linaceae such as the genera *Linum*, *Adenolinum* e.g. the species *Linum usitatissimum*, *Linum humile*, *Linum austriacum*, *Linum bienne*, *Linum angustifolium*, *Linum catharticum*, *Linum flavum*, *Linum grandiflorum*, *Adenolinum grandiflorum*, *Linum lewisii*, *Linum narbonense*, *Linum perenne*, *Linum perenne var.*
- 20 *lewisii*, *Linum pratense* or *Linum trigynum* [flax, linseed]; Lythraeae such as the genera *Punica* e.g. the species *Punica granatum* [pomegranate]; Malvaceae such as the genera *Gossypium* e.g. the species *Gossypium hirsutum*, *Gossypium arboreum*, *Gossypium barbadense*, *Gossypium herbaceum* or *Gossypium thurberi* [cotton]; Musaceae such as the genera *Musa* e.g. the species *Musa nana*, *Musa acuminata*,
- 25 *Musa paradisiaca*, *Musa* spp. [banana]; Onagraceae such as the genera *Camissonia*, *Oenothera* e.g. the species *Oenothera biennis* or *Camissonia brevipes* [primrose, evening primrose]; Palmae such as the genera *Elacis* e.g. the species *Elaeis guineensis* [oil palm]; Papaveraceae such as the genera *Papaver* e.g. the species *Papaver orientale*, *Papaver rhoeas*, *Papaver dubium* [poppy, oriental poppy, corn
- 30 poppy, field poppy, shirley poppies, field poppy, long-headed poppy, long-pod poppy]; Pedaliaceae such as the genera *Sesamum* e.g. the species *Sesamum indicum* [sesame]; Piperaceae such as the genera *Piper*, *Artanthe*, *Peperomia*, *Steffensia* e.g. the species *Piper aduncum*, *Piper amalago*, *Piper angustifolium*, *Piper auritum*, *Piper betel*, *Piper cubeba*, *Piper longum*, *Piper nigrum*, *Piper retrofractum*, *Artanthe adunca*,
- 35 *Artanthe elongata*, *Peperomia elongata*, *Piper elongatum*, *Steffensia elongata*. [Cayenne pepper, wild pepper]; Poaceae such as the genera *Hordeum*, *Secale*, *Avena*, *Sorghum*, *Andropogon*, *Holcus*, *Panicum*, *Oryza*, *Zea*, *Triticum* e.g. the species *Hordeum vulgare*, *Hordeum jubatum*, *Hordeum murinum*, *Hordeum secalinum*, *Hordeum distichon* *Hordeum aegiceras*, *Hordeum hexastichon*, *Hordeum*
- 40 *hexastichum*, *Hordeum irregulare*, *Hordeum sativum*, *Hordeum secalinum* [barley, pearl barley, foxtail barley, wall barley, meadow barley], *Secale cereale* [rye], *Avena sativa*, *Avena fatua*, *Avena byzantina*, *Avena fatua var. sativa*, *Avena hybrida* [oat],

- Sorghum bicolor*, *Sorghum halepense*, *Sorghum saccharatum*, *Sorghum vulgare*, *Andropogon drummondii*, *Holcus bicolor*, *Holcus sorghum*, *Sorghum aethiopicum*, *Sorghum arundinaceum*, *Sorghum caffrorum*, *Sorghum cernuum*, *Sorghum dochna*, *Sorghum drummondii*, *Sorghum durra*, *Sorghum guineense*, *Sorghum lanceolatum*,
5 *Sorghum nervosum*, *Sorghum saccharatum*, *Sorghum subglabrescens*, *Sorghum verticilliflorum*, *Sorghum vulgare*, *Holcus halepensis*, *Sorghum miliaceum* millet, *Panicum miliaceum* [*Sorghum*, millet], *Oryza sativa*, *Oryza latifolia* [rice], *Zea mays* [corn, maize] *Triticum aestivum*, *Triticum durum*, *Triticum turgidum*, *Triticum hybernum*, *Triticum macha*, *Triticum sativum* or *Triticum vulgare* [wheat, bread wheat, common
10 wheat], Proteaceae such as the genera *Macadamia* e.g. the species *Macadamia intergrifolia* [macadamia]; Rubiaceae such as the genera *Coffea* e.g. the species *Coffea* spp., *Coffea arabica*, *Coffea canephora* or *Coffea liberica* [coffee]; Scrophulariaceae such as the genera *Verbascum* e.g. the species *Verbascum blattaria*, *Verbascum chaixii*, *Verbascum densiflorum*, *Verbascum lagurus*, *Verbascum longifolium*,
15 *Verbascum lychnitis*, *Verbascum nigrum*, *Verbascum olympicum*, *Verbascum phlomoides*, *Verbascum phoenicum*, *Verbascum pulverulentum* or *Verbascum thapsus* [mullein, white moth mullein, nettle-leaved mullein, dense-flowered mullein, silver mullein, long-leaved mullein, white mullein, dark mullein, greek mullein, orange mullein, purple mullein, hoary mullein, great mullein]; Solanaceae such as the genera
20 *Capsicum*, *Nicotiana*, *Solanum*, *Lycopersicon* e.g. the species *Capsicum annuum*, *Capsicum annuum* var. *glabriusculum*, *Capsicum frutescens* [pepper]; *Capsicum annuum* [paprika], *Nicotiana tabacum*, *Nicotiana alata*, *Nicotiana attenuata*, *Nicotiana glauca*, *Nicotiana langsdorffii*, *Nicotiana obtusifolia*, *Nicotiana quadrivalvis*, *Nicotiana repanda*, *Nicotiana rustica*, *Nicotiana sylvestris* [tobacco], *Solanum tuberosum* [potato],
25 *Solanum melongena* [egg-plant] (*Lycopersicon esculentum*, *Lycopersicon lycopersicum*., *Lycopersicon pyriforme*, *Solanum integrifolium* or *Solanum lycopersicum* [tomato]; Sterculiaceae such as the genera *Theobroma* e.g. the species *Theobroma cacao* [cacao]; Theaceae such as the genera *Camellia* e.g. the species *Camellia sinensis*) [tea].
30 All abovementioned organisms can in principle also function as host organisms.

- [0095.0.0.0]** Particular preferred plants are plants selected from the group consisting of Asteraceae such as the genera *Helianthus*, *Tagetes* e.g. the species *Helianthus annuus* [sunflower], *Tagetes lucida*, *Tagetes erecta* or *Tagetes tenuifolia* [Marigold];
Brassicaceae such as the genera *Brassica*, *Arabidopsis* e.g. the species *Brassica napus*, *Brassica rapa* ssp., *Brassica juncea* [canola, oilseed rape, turnip rape] or
35 *Arabidopsis thaliana*; Fabaceae such as the genera *Glycine* e.g. the species *Glycine max*, *Soja hispida* or *Soja max* [soybean]; Linaceae such as the genera *Linum* e.g. the species *Linum usitatissimum*, [flax, linseed]; Poaceae such as the genera *Hordeum*, *Secale*, *Avena*, *Sorghum*, *Oryza*, *Zea*, *Triticum* e.g. the species *Hordeum vulgare*
40 [barley]; *Secale cereale* [rye], *Avena sativa*, *Avena fatua*, *Avena byzantina*, *Avena fatua* var. *sativa*, *Avena hybrida* [oat], *Sorghum bicolor* [*Sorghum*, millet], *Oryza sativa*,

Oryza latifolia [rice], *Zea mays* [corn, maize] *Triticum aestivum*, *Triticum durum*, *Triticum turgidum*, *Triticum hybernum*, *Triticum macha*, *Triticum sativum* or *Triticum vulgare* [wheat, bread wheat, common wheat]; Solanaceae such as the genera *Solanum*, *Lycopersicon* e.g. the species *Solanum tuberosum* [potato], *Lycopersicon esculentum*, *Lycopersicon lycopersicum*., *Lycopersicon pyriforme*, *Solanum integrifolium* or *Solanum lycopersicum* [tomato].

[0096.0.0.0] All abovementioned organisms can in principle also function as host organisms.

[0097.0.0.0] With regard to the nucleic acid sequence as depicted below a nucleic acid construct which contains a nucleic acid sequence mentioned herein or an organism (= transgenic organism) which is transformed with said nucleic acid sequence or said nucleic acid construct, "transgene" means all those constructs which have been brought about by genetic manipulation methods, preferably in which either

a) the nucleic acid sequence as depicted in SEQ ID NO: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41 43, 45, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83, 85, 87, 89, 91, 93, 95, 97, 99, 101, 103, 105, 107, 109, 111, 113, 115, 117, 119, 121, 123, 125, 127, 129, 131, 133, 135, 137, 139, 141, 143, 145, 147, 149, 151, 153, 155, 157, 159, 161, 163, 165, 167, 169, 171, 173, 175, 177, 179, 181, 183, 185, 187, 189, 191, 193, 195, 197, 199, 201, 203, 205, 207, 209, 211, 213, 215, 217, 219, 221, 223, 225, 227, 229, 231, 233, 235, 237, 239, 241, 243, 245, 247, 249, 251, 253, 255, 257, 259, 261, 263, 265, 267, 269, 271, 273, 275, 277, 279, 281, 283, 285, 287, 289, 291, 293, 295, 297, 299, 301, 303, 305, 307, 309, 311, 313, 315, 317, 319, 321, 323, 325, 327, 329, 331, 333, 335, 337, 339, 341, 343, 345, 347, 349, 351, 353, 355, 357, 359, 361, 363, 365, 367, 369, 371, 373, 375, 377, 379, 381, 383, 385, 387, 389, 391 or 393 or a derivative thereof, or

b) a genetic regulatory element, for example a promoter, which is functionally linked to the nucleic acid sequence as depicted in SEQ ID NO: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41 43, 45, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83, 85, 87, 89, 91, 93, 95, 97, 99, 101, 103, 105, 107, 109, 111, 113, 115, 117, 119, 121, 123, 125, 127, 129, 131, 133, 135, 137, 139, 141, 143, 145, 147, 149, 151, 153, 155, 157, 159, 161, 163, 165, 167, 169, 171, 173, 175, 177, 179, 181, 183, 185, 187, 189, 191, 193, 195, 197, 199, 201, 203, 205, 207, 209, 211, 213, 215, 217, 219, 221, 223, 225, 227, 229, 231, 233, 235, 237, 239, 241, 243, 245, 247, 249, 251, 253, 255, 257, 259, 261, 263, 265, 267, 269, 271, 273, 275, 277, 279, 281, 283, 285, 287, 289, 291, 293, 295, 297, 299, 301, 303, 305, 307, 309, 311, 313, 315, 317, 319, 321, 323, 325, 327, 329, 331, 333, 335, 337, 339, 341, 343, 345, 347, 349, 351, 353, 355, 357, 359, 361,

363, 365, 367, 369, 371, 373, 375, 377, 379, 381, 383, 385, 387, 389, 391 or 393
or a derivative thereof, or

c) (a) and (b)

is/are not present in its/their natural genetic environment or has/have been modified by
5 means of genetic manipulation methods, it being possible for the modification to be, by
way of example, a substitution, addition, deletion, inversion or insertion of one or more
nucleotide. "Natural genetic environment" means the natural chromosomal locus in the
organism of origin or the presence in a genomic library. In the case of a genomic
library, the natural, genetic environment of the nucleic acid sequence is preferably at
10 least partially still preserved. The environment flanks the nucleic acid sequence at least
on one side and has a sequence length of at least 50 bp, preferably at least 500 bp,
particularly preferably at least 1000 bp, very particularly preferably at least 5000 bp.

[0098.0.0.0] The use of the nucleic acid sequence according to the invention or of
the nucleic acid construct according to the invention for the generation of transgenic
15 plants is therefore also subject matter of the invention.

[0099.0.0.0] The fine chemical, which is synthesized in the organism, in particular the
microorganism, the cell, the tissue or the plant, of the invention can be isolated if
desired. Depending on the use of the fine chemical, different purities resulting from the
purification may be advantageous as will be described herein below.

20 **[0100.0.0.0]** In an advantageous embodiment of the invention, the organism takes
the form of a plant whose fine chemical content is modified advantageously owing to
the nucleic acid molecule of the present invention expressed. This is important for plant
breeders since, for example, the nutritional value of organisms such as a plant is very
often limited by its amino acid, protein, co-factor and/or vitamin content to mention only
25 a couple of them. For example in feed for monogastric animals a few essential amino
acids such as lysine, threonine or methionine are very often limiting. After the biological
activity of the nucleic acid and/or protein of the invention has been increased or
generated, or after the expression of nucleic acid molecule or polypeptide according to
the invention has been generated or increased, the transgenic plant generated thus is
30 grown on or in a nutrient medium or else in the soil and subsequently harvested.

[0101.0.0.0] The plants or parts thereof, e.g. the leaves, roots, flowers, and/or stems
and/or other harvestable material as described below, can then be used directly as
foodstuffs or animal feeds or else be further processed. Again, the amino acids can be
purified further in the customary manner via extraction and precipitation or via ion
35 exchangers and other methods known to the person skilled in the art and described
herein below. Products which are suitable for various applications and which result
from these different processing procedures are for example amino acids or amino acid
compositions which can still comprise further plant components in different amounts,

advantageously in the range of from 0 to 99% by weight or more, preferably from below 90%, 80%, 70%, 60% or 50% by weight, especially preferably below 40%, 30%, 20% or 10% by weight. The plants can also advantageously be used directly without further processing, e.g. as feed or for extraction.

- 5 **[0102.0.0.0]** The chemically pure fine chemical or chemically pure compositions comprising the fine chemical may also be produced by the process described above. To this end, the fine chemical or the compositions are isolated in the known manner from an organism according to the invention, such as the microorganisms, non-human animal or the plants, and/or their culture medium in which or on which the organisms
10 had been grown. These chemically pure fine chemical or said compositions are advantageous for applications in the field of the food industry, the cosmetics industry or the pharmaceutical industry.

- [0103.0.0.0]** Thus, the content of plant components and preferably also further impurities is as low as possible, and the abovementioned fine chemical are obtained in
15 as pure form as possible. In these applications, the content of plant components advantageously amounts to less than 10% by weight, preferably 1% by weight, more preferably 0.1% by weight, very especially preferably 0.01% by weight or less.

- [0104.0.0.0]** Accordingly, the fine chemical produced by the present invention is at least 0.1% by weight pure, preferably more than 1% by weight pure, more preferred
20 10% by weight pure, even more preferred are more than 50%, 60%, 70% or 80% by weight pure, even more preferred are more than 90%, 91%, 92%, 93%, 94% or 95% weight pure, most preferred are 96%, 97%, 98% or 99% by weight or more pure.

- [0105.0.0.0]** In this context, the amount of the fine chemical in a cell of the invention may be increased according to the process of the invention by at least a factor of 1.1,
25 preferably at least a factor of 1.5; 2; or 5, especially preferably by at least a factor of 10 or 30, very especially preferably by at least a factor of 50, in comparison with the wild type, control or reference. Preferably, said increase is found in a tissue of an organism, more preferred in the organism itself or in a harvestable part thereof.

- [0106.0.0.0]** In principle, the fine chemicals produced can be increased in two ways
30 by the process according to the invention. The pool of free fine chemicals, in particular of the free fine chemical, and/or the content of bound for example protein-bound fine chemicals, in particular of the protein-bound fine chemical may advantageously be increased.

- [0107.0.0.0]** It may be advantageous to increase the pool of free fine chemical in the
35 transgenic organisms by the process according to the invention in order to isolate high amounts of the pure fine chemical.

[0108.0.0.0] In another preferred embodiment of the invention a combination of the increased expression of the nucleic acid sequence or the protein of the invention together with the transformation of a protein or polypeptid, which functions as a sink for the desired fine chemical such as an amino acid for example methionine, lysine or
5 threonine in the organism is useful to increase the production of the fine chemical (see US 5,589,616, WO 96/38574, WO 97/07665, WO 97/28247, US 4,886,878, US 5,082,993 and US 5,670,635). Galili et al. [Transgenic Res. 2000] showed, that enhancing the synthesis of threonine by a feed back insensitive aspartate kinase didnot lead only to an increase in free threonine but also in protein bound threonine.

10 **[0109.0.0.0]** It may also be advantageous to increase the content of the bound fine chemical.

[0110.0.0.0] In a preferred embodiment, the fine chemical is produced in accordance with the invention and, if desired, is isolated. The production of further fine chemicals for example amino acids such as lysine and of amino acid mixtures by the process
15 according to the invention is advantageous.

[0111.0.0.0] In the case of the fermentation of microorganisms, the abovementioned fine chemical e.g. amino acid or mixtures of amino acids may accumulate in the medium and/or the cells. If microorganisms are used in the process according to the invention, the fermentation broth can be processed after the cultivation. Depending on
20 the requirement, all or some of the biomass can be removed from the fermentation broth by separation methods such as, for example, centrifugation, filtration, decanting or a combination of these methods, or else the biomass can be left in the fermentation broth. The fermentation broth can subsequently be reduced, or concentrated, with the aid of known methods such as, for example, rotary evaporator, thin-layer evaporator,
25 falling film evaporator, by reverse osmosis or by nanofiltration. This concentrated fermentation broth can subsequently be processed by lyophilization, spray drying, spray granulation or by other methods.

[0112.0.0.0] To purify a fine chemical such as an amino acid, a product-containing fermentation broth from which the biomass has been separated may be subjected to
30 chromatography with a suitable resin such as ion exchange resin for example anion or cation exchange resin, hydrophobic resin or hydrophilic resin for example epoxy resin, polyurethane resin or polyacrylamid resin, or resin for separation according to the molecular weight of the compounds for example polyvinyl chloride homopolymer resin or resins composed for example of polymers of acrylic acid, crosslinked with
35 polyalkenyl ethers or divinyl glycol such as Carbopol®, Pemulen® and Noveon®. If necessary these chromatography steps may be repeated using the same or other chromatography resins. The skilled worker is familiar with the choice of suitable chromatography resins and their most effective use. The purified product may be

concentrated by filtration or ultrafiltration and stored at a temperature, which ensures the maximum stability of the product.

[0113.0.0.0] The identity and purity of the compound(s) isolated can be determined by prior-art techniques. They encompass high-performance liquid chromatography (HPLC), spectroscopic methods, mass spectrometry (MS), staining methods, thin-layer chromatography, NIRS, enzyme assays or microbiological assays. These analytical methods are compiled in: Patek et al. (1994) Appl. Environ. Microbiol. 60:133-140; Malakhova et al. (1996) Biotekhnologiya 11 27-32; and Schmidt et al. (1998) Bioprocess Engineer. 19:67-70. Ulmann's Encyclopedia of Industrial Chemistry (1996) Bd. A27, VCH Weinheim, pp. 89-90, pp. 521-540, pp. 540-547, pp. 559-566, 575-581 and pp. 581-587; Michal, G (1999) Biochemical Pathways: An Atlas of Biochemistry and Molecular Biology, John Wiley and Sons; Fallon, A. et al. (1987) Applications of HPLC in Biochemistry in: Laboratory Techniques in Biochemistry and Molecular Biology, vol. 17.

[0114.0.0.0] Fine chemicals like amino acids can for example be detected advantageously via HPLC separation in ethanolic extract as described by Geigenberger et al. (Plant Cell & Environ, 19, 1996: 43-55). Amino acids can be extracted with hot water. After filtration the extracts are diluted with water containing 20 mg/mL sodium acetate. The separation and detection of the amino acids is performed using an anion exchange column and an electrochemical detector. Technical details can be taken from Y. Ding et al., 2002, Direct determination of free amino acids and sugars in green tea by anion-exchange chromatography with integrated pulsed amperometric detection, J Chromatogr A, (2002) 982; 237-244, or e.g. from Karchi et al., 1993, Plant J. 3: 721-727; Matthews MJ, 1997 (Lysine, threonine and methionine biosynthesis. In BK Singh, ed, Plant Amino Acids: Biochemistry and Biotechnology. Dekker, New York, pp 205-225; H Hesse and R Hoefgen. (2003) Molecular aspects of methionine biosynthesis. TIPS 8(259-262).

[0115.0.0.0] In a preferred embodiment, the present invention relates to a process for the production of the fine chemical comprising or generating in an organism or a part thereof the expression of at least one nucleic acid molecule comprising a nucleic acid molecule selected from the group consisting of:

a) nucleic acid molecule encoding, preferably at least the mature form, of the polypeptide as depicted in SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208,

- 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394 or a fragment thereof, which confers an increase in the amount of the fine chemical in an organism or a part thereof;
- 5
- b) nucleic acid molecule comprising, preferably at least the mature form, of the nucleic acid molecule as depicted in SEQ ID NO: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, 43, 45, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83, 85, 87, 89, 91, 93, 95, 97, 99, 101, 103, 105, 107, 109, 111, 113, 115, 117, 119, 121, 123, 125, 127, 129, 131, 133, 135, 137, 139, 141, 143, 145, 147, 149, 151, 153, 155, 157, 159, 161, 163, 165, 167, 169, 171, 173, 175, 177, 179, 181, 183, 185, 187, 189, 191, 193, 195, 197, 199, 201, 203, 205, 207, 209, 211, 213, 215, 217, 219, 221, 223, 225, 227, 229, 231, 233, 235, 237, 239, 241, 243, 245, 247, 249, 251, 253, 255, 257, 259, 261, 263, 265, 267, 269, 271, 273, 275, 277, 279, 281, 283, 285, 287, 289, 291, 293, 295, 297, 299, 301, 303, 305, 307, 309, 311, 313, 315, 317, 319, 321, 323, 325, 327, 329, 331, 333, 335, 337, 339, 341, 343, 345, 347, 349, 351, 353, 355, 357, 359, 361, 363, 365, 367, 369, 371, 373, 375, 377, 379, 381, 383, 385, 387, 389, 391 or 393;
- 10
- 15
- 20
- c) nucleic acid molecule whose sequence can be deduced from a polypeptide sequence encoded by a nucleic acid molecule of (a) or (b) as result of the degeneracy of the genetic code and conferring an increase in the amount of the fine chemical in an organism or a part thereof;
- 25
- d) nucleic acid molecule encoding a polypeptide which has at least 50% identity with the amino acid sequence of the polypeptide encoded by the nucleic acid molecule of (a) to (c) and conferring an increase in the amount of the fine chemical in an organism or a part thereof;
- e) nucleic acid molecule which hybridizes with a nucleic acid molecule of (a) to (c) under stringent hybridisation conditions and conferring an increase in the amount of the fine chemical in an organism or a part thereof;
- 30
- f) nucleic acid molecule encoding a polypeptide, the polypeptide being derived by substituting, deleting and/or adding one or more amino acids of the amino acid sequence of the polypeptide encoded by the nucleic acid molecules (a) to (d), preferably to (a) to (c) and conferring an increase in the amount of the fine chemical in an organism or a part thereof;
- 35

- g) nucleic acid molecule encoding a fragment or an epitope of a polypeptide which is encoded by one of the nucleic acid molecules of (a) to (e), preferably to (a) to (c) and conferring an increase in the amount of the fine chemical in an organism or a part thereof;
- 5 h) nucleic acid molecule comprising a nucleic acid molecule which is obtained by amplifying nucleic acid molecules from a cDNA library or a genomic library using the primers as depicted in SEQ ID NO: 53 or SEQ ID NO: 54 and conferring an increase in the amount of the fine chemical in an organism or a part thereof;
- 10 i) nucleic acid molecule encoding a polypeptide which is isolated, e.g. from an expression library, with the aid of monoclonal antibodies against a polypeptide encoded by one of the nucleic acid molecules of (a) to (h), preferably to (a) to (c), and conferring an increase in the amount of the fine chemical in an organism or a part thereof;
- 15 j) nucleic acid molecule which encodes a polypeptide comprising the consensus sequence as depicted in SEQ ID NO: 47, SEQ ID NO: 48, SEQ ID NO: 49, SEQ ID NO: 50, SEQ ID NO: 51, SEQ ID NO: 52, SEQ ID NO: 397, SEQ ID NO: 398, SEQ ID NO: 399 and/or SEQ ID NO: 400 and conferring an increase in the amount of the fine chemical in an organism or a part thereof ; and/or
- 20 k) nucleic acid molecule which is obtainable by screening a suitable library under stringent conditions with a probe comprising one of the sequences of the nucleic acid molecule of (a) to (j), preferably to (a) to (c), or with a fragment of at least 15 nt, preferably 20 nt, 30 nt, 50 nt, 100 nt, 200 nt or 500 nt of the nucleic acid molecule characterized in (a) to (j), preferably to (a) to (c), and conferring an increase in the amount of the fine chemical in an organism or a part thereof;
- 25 or which comprises a sequence which is complementary thereto.

[0116.0.0.0] In one embodiment, the nucleic acid molecule used in the process distinguishes over the sequence as depicted in SEQ ID NO: 1, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83, 85, 87, 89, 91, 93, 95, 97, 99, 101, 103, 105, 107, 109, 111, 113, 115, 117, 119, 121, 123, 125, 127, 129, 131, 133, 135, 137, 139, 141, 143, 145, 147, 149, 151, 153, 155, 157, 159, 161, 163, 165, 167, 169, 171, 173, 175, 177, 179, 181, 183, 185, 187, 189, 191, 193, 195, 197, 199, 201, 203, 205, 207, 209, 211, 213, 215, 217, 219, 221, 223, 225, 227, 229, 231, 233, 235, 237, 239, 241, 243, 245, 247, 249, 251, 253, 255, 257, 259, 261, 263, 265, 267, 269, 271, 273, 275, 277, 279, 281, 283, 285, 287, 289, 291, 293, 295, 297, 299, 301, 303, 305, 307, 309, 311, 313, 315, 317, 319, 321, 323, 325, 327, 329, 331, 333, 335, 337, 339, 341, 343, 345, 347, 349, 351, 353, 355, 357, 359, 361, 363, 365, 367, 369, 371, 373, 375, 377, 379, 381, 383, 385, 387, 389, 391 or 393 by one or more nucleotides or does not consist of the sequence as depicted in SEQ ID NO: 1, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75,

77, 79, 81, 83, 85, 87, 89, 91, 93, 95, 97, 99, 101, 103, 105, 107, 109, 111, 113, 115, 117, 119, 121, 123, 125, 127, 129, 131, 133, 135, 137, 139, 141, 143, 145, 147, 149, 151, 153, 155, 157, 159, 161, 163, 165, 167, 169, 171, 173, 175, 177, 179, 181, 183, 185, 187, 189, 191, 193, 195, 197, 199, 201, 203, 205, 207, 209, 211, 213, 215, 217, 219, 221, 223, 225, 227, 229, 231, 233, 235, 237, 239, 241, 243, 245, 247, 249, 251, 253, 255, 257, 259, 261, 263, 265, 267, 269, 271, 273, 275, 277, 279, 281, 283, 285, 287, 289, 291, 293, 295, 297, 299, 301, 303, 305, 307, 309, 311, 313, 315, 317, 319, 321, 323, 325, 327, 329, 331, 333, 335, 337, 339, 341, 343, 345, 347, 349, 351, 353, 355, 357, 359, 361, 363, 365, 367, 369, 371, 373, 375, 377, 379, 381, 383, 385, 387, 389, 391 or 393. In one embodiment, the nucleic acid molecule of the present invention is less than 100%, 99,999%, 99,99%, 99,9% or 99% identical to the sequence as depicted in SEQ ID NO: 1, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83, 85, 87, 89, 91, 93, 95, 97, 99, 101, 103, 105, 107, 109, 111, 113, 115, 117, 119, 121, 123, 125, 127, 129, 131, 133, 135, 137, 139, 141, 143, 145, 147, 149, 151, 153, 155, 157, 159, 161, 163, 165, 167, 169, 171, 173, 175, 177, 179, 181, 183, 185, 187, 189, 191, 193, 195, 197, 199, 201, 203, 205, 207, 209, 211, 213, 215, 217, 219, 221, 223, 225, 227, 229, 231, 233, 235, 237, 239, 241, 243, 245, 247, 249, 251, 253, 255, 257, 259, 261, 263, 265, 267, 269, 271, 273, 275, 277, 279, 281, 283, 285, 287, 289, 291, 293, 295, 297, 299, 301, 303, 305, 307, 309, 311, 313, 315, 317, 319, 321, 323, 325, 327, 329, 331, 333, 335, 337, 339, 341, 343, 345, 347, 349, 351, 353, 355, 357, 359, 361, 363, 365, 367, 369, 371, 373, 375, 377, 379, 381, 383, 385, 387, 389, 391 or 393. In another embodiment, the nucleic acid molecule does not encode a polypeptide of the sequence as depicted in SEQ ID NO: 2, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394. In another embodiment, the nucleic acid molecule does not encode a polypeptide of the sequence of the present invention is less than 100%, 99,999%, 99,99%, 99,9% or 99% identical to the sequence as depicted in SEQ ID NO: 2, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306,

308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394. In another embodiment, the nucleic acid molecule encodes a polypeptide of the sequence as depicted in SEQ ID

5 NO: 2, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232,

10 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394 and distinguishes

15 over said sequence by one or more amino acids preferably by 1, 2, 3, 4, 5, 6, 7, 8, 9 or 10 amino acids. In further another advantageously embodiment, the nucleic acid molecule used in the process distinguishes over the sequence as depicted in SEQ ID NO: 3, SEQ ID NO: 5, SEQ ID NO: 7, SEQ ID NO: 9, SEQ ID NO: 11, SEQ ID NO: 13, SEQ ID NO: 15, SEQ ID NO: 17, SEQ ID NO: 19, SEQ ID NO: 21, SEQ ID NO: 23,

20 SEQ ID NO: 25, SEQ ID NO: 27, SEQ ID NO: 29, SEQ ID NO: 31, SEQ ID NO: 33, SEQ ID NO: 35, SEQ ID NO: 37, SEQ ID NO: 39, SEQ ID NO: 41 SEQ ID NO: 43 or SEQ ID NO: 45 by one or more nucleotides or does not consist of the sequence as depicted in SEQ ID NO: 3, SEQ ID NO: 5, SEQ ID NO: 7, SEQ ID NO: 9, SEQ ID NO: 11, SEQ ID NO: 13, SEQ ID NO: 15, SEQ ID NO: 17, SEQ ID NO: 19, SEQ ID NO: 21,

25 SEQ ID NO: 23, SEQ ID NO: 25, SEQ ID NO: 27, SEQ ID NO: 29, SEQ ID NO: 31, SEQ ID NO: 33, SEQ ID NO: 35, SEQ ID NO: 37, SEQ ID NO: 39, SEQ ID NO: 41 SEQ ID NO: 43 or SEQ ID NO: 45. In one advantageously embodiment, the nucleic acid molecule of the present invention is less than 100%, 99,999%, 99,99%, 99,9% or 99% identical to the sequence as depicted in SEQ ID NO: 3, SEQ ID NO: 5, SEQ ID NO: 7, SEQ ID NO: 9, SEQ ID NO: 11, SEQ ID NO: 13, SEQ ID NO: 15, SEQ ID NO: 17, SEQ ID NO: 19, SEQ ID NO: 21, SEQ ID NO: 23, SEQ ID NO: 25, SEQ ID NO: 27, SEQ ID NO: 29, SEQ ID NO: 31, SEQ ID NO: 33, SEQ ID NO: 35, SEQ ID NO: 37, SEQ ID NO: 39, SEQ ID NO: 41 SEQ ID NO: 43 or SEQ ID NO: 45. In another

30 advantageously embodiment, the nucleic acid molecule does not encode a polypeptide of the sequence as depicted in SEQ ID NO: 4, SEQ ID NO: 6, SEQ ID NO: 8, SEQ ID NO: 10, SEQ ID NO: 12, SEQ ID NO: 14, SEQ ID NO: 16, SEQ ID NO: 18, SEQ ID NO: 20, SEQ ID NO: 22, SEQ ID NO: 24, SEQ ID NO: 26, SEQ ID NO: 28, SEQ ID NO: 30, SEQ ID NO: 32, SEQ ID NO: 34, SEQ ID NO: 36, SEQ ID NO: 38, SEQ ID NO: 40, SEQ ID NO: 42, SEQ ID NO: 44 or SEQ ID NO: 46.

35

40 **[0117.0.0.0]** Unless otherwise specified, the terms "polynucleotides", "nucleic acid" and "nucleic acid molecule" are interchangeably in the present context. Unless

otherwise specified, the terms "peptide", "polypeptide" and "protein" are interchangeably in the present context. The term "sequence" may relate to polynucleotides, nucleic acids, nucleic acid molecules, peptides, polypeptides and proteins, depending on the context in which the term "sequence" is used. The terms

5 "gene(s)", "polynucleotide", "nucleic acid sequence", "nucleotide sequence", or "nucleic acid molecule(s)" as used herein refers to a polymeric form of nucleotides of any length, either ribonucleotides or deoxyribonucleotides. The terms refer only to the primary structure of the molecule.

[0118.0.0.0] Thus, the terms "gene(s)", "polynucleotide", "nucleic acid sequence",

10 "nucleotide sequence", or "nucleic acid molecule(s)" as used herein include double- and single-stranded DNA and RNA. They also include known types of modifications, for example, methylation, "caps", substitutions of one or more of the naturally occurring nucleotides with an analog. Preferably, the DNA or RNA sequence of the invention comprises a coding sequence encoding the herein defined polypeptide.

15 [0119.0.0.0] A "coding sequence" is a nucleotide sequence, which is transcribed into mRNA and/or translated into a polypeptide when placed under the control of appropriate regulatory sequences. The boundaries of the coding sequence are determined by a translation start codon at the 5'-terminus and a translation stop codon at the 3'-terminus. A coding sequence can include, but is not limited to mRNA, cDNA,

20 recombinant nucleotide sequences or genomic DNA, while introns may be present as well under certain circumstances.

[0120.0.0.0] Nucleic acid molecules with the sequence as depicted in SEQ ID NO: 1, SEQ ID NO: 3, SEQ ID NO: 5, SEQ ID NO: 7, SEQ ID NO: 9, SEQ ID NO: 11, SEQ ID NO: 13, SEQ ID NO: 15, SEQ ID NO: 17, SEQ ID NO: 19, SEQ ID NO: 21, SEQ ID NO: 23, SEQ ID NO: 25, SEQ ID NO: 27, SEQ ID NO: 29, SEQ ID NO: 31, SEQ ID NO: 33, SEQ ID NO: 35, SEQ ID NO: 37, SEQ ID NO: 39, SEQ ID NO: 41, SEQ ID NO: 43 or SEQ ID NO: 45, nucleic acid molecules which are derived from the amino acid sequences as depicted in SEQ ID NO: 2, SEQ ID NO: 4, SEQ ID NO: 6, SEQ ID NO: 8, SEQ ID NO: 10, SEQ ID NO: 12, SEQ ID NO: 14, SEQ ID NO: 16, SEQ ID NO: 18,

30 SEQ ID NO: 20, SEQ ID NO: 22, SEQ ID NO: 24, SEQ ID NO: 26, SEQ ID NO: 28, SEQ ID NO: 30, SEQ ID NO: 32, SEQ ID NO: 34, SEQ ID NO: 36, SEQ ID NO: 38, SEQ ID NO: 40, SEQ ID NO: 42, SEQ ID NO: 44 or SEQ ID NO: 46 or from polypeptides comprising the consensus sequence as depicted in SEQ ID NO: 47, SEQ ID NO: 48, SEQ ID NO: 49, SEQ ID NO: 50, SEQ ID NO: 51, SEQ ID NO: 52, SEQ ID NO: 397, SEQ ID NO: 398, SEQ ID NO: 399 and/or SEQ ID NO: 400, or their derivatives or homologues encoding polypeptides with the enzymatic or biological activity of a protein as depicted in SEQ ID NO: 2, SEQ ID NO: 4, SEQ ID NO: 6, SEQ ID NO: 8, SEQ ID NO: 10, SEQ ID NO: 12, SEQ ID NO: 14, SEQ ID NO: 16, SEQ ID NO: 18, SEQ ID NO: 20, SEQ ID NO: 22, SEQ ID NO: 24, SEQ ID NO: 26, SEQ ID NO: 28, SEQ ID NO: 30, SEQ ID NO: 32, SEQ ID NO: 34, SEQ ID NO: 36, SEQ ID NO: 38, SEQ ID NO: 40, SEQ ID NO: 42, SEQ ID NO: 44 or SEQ ID NO: 46 or from

40 NO: 28, SEQ ID NO: 30, SEQ ID NO: 32, SEQ ID NO: 34, SEQ ID NO: 36, SEQ ID NO: 38, SEQ ID NO: 40, SEQ ID NO: 42, SEQ ID NO: 44 or SEQ ID NO: 46 or from polypeptides comprising the consensus sequence as depicted in SEQ ID NO: 47, SEQ ID NO: 48, SEQ ID NO: 49, SEQ ID NO: 50, SEQ ID NO: 51, SEQ ID NO: 52, SEQ ID NO: 397, SEQ ID NO: 398, SEQ ID NO: 399 and/or SEQ ID NO: 400, or their derivatives or homologues encoding polypeptides with the enzymatic or biological activity of a protein as depicted in SEQ ID NO: 2, SEQ ID NO: 4, SEQ ID NO: 6, SEQ ID NO: 8, SEQ ID NO: 10, SEQ ID NO: 12, SEQ ID NO: 14, SEQ ID NO: 16, SEQ ID NO: 18, SEQ ID NO: 20, SEQ ID NO: 22, SEQ ID NO: 24, SEQ ID NO: 26, SEQ ID NO: 28, SEQ ID NO: 30, SEQ ID NO: 32, SEQ ID NO: 34, SEQ ID NO: 36, SEQ ID NO: 38, SEQ ID NO: 40, SEQ ID NO: 42, SEQ ID NO: 44 or SEQ ID NO: 46 or from

NO: 38, SEQ ID NO: 40, SEQ ID NO: 42, SEQ ID NO: 44 or SEQ ID NO: 46 and/or conferring a fine chemical increase after increasing its expression or activity are advantageously increased in the process according to the invention.

5 **[0121.0.0.0]** In one embodiment, said sequences are cloned into nucleic acid constructs, either individually or in combination. These nucleic acid constructs enable an optimal synthesis of the fine chemical produced in the process according to the invention.

[0122.0.0.0] Nucleic acid molecules, which are advantageous for the process according to the invention and which encode polypeptides with the biological activity of
10 the protein of the invention can be determined from generally accessible databases.

[0123.0.0.0] Those, which must be mentioned, in particular in this context are general gene databases such as the EMBL database (Stoesser G. et al., Nucleic Acids Res 2001, Vol. 29, 17-21), the GenBank database (Benson D.A. et al., Nucleic Acids Res 2000, Vol. 28, 15-18), or the PIR database (Barker W. C. et al., Nucleic Acids Res.
15 1999, Vol. 27, 39-43). It is furthermore possible to use organism-specific gene databases for determining advantageous sequences, in the case of yeast for example advantageously the SGD database (Cherry J. M. et al., Nucleic Acids Res. 1998, Vol. 26, 73-80) or the MIPS database (Mewes H.W. et al., Nucleic Acids Res. 1999, Vol. 27, 44-48), in the case of E. coli the GenProtEC database
20 (<http://web.bham.ac.uk/bcm4ght6/res.html>), and in the case of Arabidopsis the TAIR-database (Huala, E. et al., Nucleic Acids Res. 2001 Vol. 29(1), 102-5) or the MIPS database.

[0124.0.0.0] The nucleic acid molecules used in the process according to the invention take the form of isolated nucleic acid sequences, which encode polypeptides
25 having the biological activity represented by a protein as depicted in SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172,
30 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342,
35 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394 and conferring the fine chemical increase.

[0125.0.0.0] The nucleic acid sequence(s) used in the process for the production of the fine chemical in transgenic organisms originate advantageously from an eukaryote but may also originate from a prokaryote or an archaebacterium, thus it can be derived from e.g. a microorganism, an animal or a plant.

- 5 **[0126.0.0.0]** For the purposes of the invention, as a rule the plural is intended to encompass the singular and vice versa.

[0127.0.0.0] In order to improve the introduction of the nucleic acid sequences and the expression of the sequences in the transgenic organisms, which are used in the process, the nucleic acid sequences are incorporated into a nucleic acid construct
10 and/or a vector. In addition to the herein described sequences which are used in the process according to the invention, further nucleic acid sequences, advantageously of biosynthesis genes of amino acids, carbohydrates, lipids, fatty acids, vitamins etc. produced in the process according to the invention, may additionally be present in the nucleic acid construct or in the vector and may be introduced into the organism
15 together. However, these additional sequences may also be introduced into the organisms via other, separate nucleic acid constructs or vectors.

[0128.0.0.0] Using the herein mentioned cloning vectors and transformation methods such as those which are published and cited in: Plant Molecular Biology and Biotechnology (CRC Press, Boca Raton, Florida), chapter 6/7, pp. 71-119 (1993);
20 F.F. White, Vectors for Gene Transfer in Higher Plants; in: Transgenic Plants, vol. 1, Engineering and Utilization, Ed.: Kung and R. Wu, Academic Press, 1993, 15-38; B. Jenes et al., Techniques for Gene Transfer, in: Transgenic Plants, vol. 1, Engineering and Utilization, Ed.: Kung and R. Wu, Academic Press (1993), 128-143; Potrykus, Annu. Rev. Plant. Physiol. Plant Molec. Biol. 42 (1991), 205-225) and further
25 cited below, the nucleic acids may be used for the recombinant modification of a wide range of organisms, in particular prokaryotic or eukaryotic microorganisms or plants, so that they become a better and more efficient producer of the fine chemical produced in the process according to the invention. This improved production, or production efficiency, of the fine chemical or products derived there from, such as modified
30 proteins, can be brought about by a direct effect of the manipulation or by an indirect effect of this manipulation.

[0129.0.0.0] In one embodiment, the nucleic acid molecule according to the invention originates from a plant, such as a plant selected from the families Aceraceae, Anacardiaceae, Apiaceae, Asteraceae, Brassicaceae, Cactaceae, Cucurbitaceae,
35 Euphorbiaceae, Fabaceae, Malvaceae, Nymphaeaceae, Papaveraceae, Rosaceae, Salicaceae, Solanaceae, Arecaceae, Bromeliaceae, Cyperaceae, Iridaceae, Liliaceae, Orchidaceae, Gentianaceae, Labiaceae, Magnoliaceae, Ranunculaceae, Carifolaceae, Rubiaceae, Scrophulariaceae, Caryophyllaceae, Ericaceae, Polygonaceae, Violaceae, Juncaceae or Poaceae and preferably from a plant selected from the group of the

families Apiaceae, Asteraceae, Brassicaceae, Cucurbitaceae, Fabaceae, Papaveraceae, Rosaceae, Solanaceae, Liliaceae or Poaceae. Preferred are crop plants and in particular plants mentioned herein above as host plants such as the families and genera mentioned above for example preferred the species *Anacardium occidentale*, *Calendula officinalis*, *Carthamus tinctorius*, *Cichorium intybus*, *Cynara scolymus*, *Helianthus annuus*, *Tagetes lucida*, *Tagetes erecta*, *Tagetes tenuifolia*; *Daucus carota*; *Corylus avellana*, *Corylus colurna*, *Borago officinalis*; *Brassica napus*, *Brassica rapa* ssp., *Sinapis arvensis* *Brassica juncea*, *Brassica juncea* var. *juncea*, *Brassica juncea* var. *crispifolia*, *Brassica juncea* var. *foliosa*, *Brassica nigra*, *Brassica sinapioides*, *Melanosinapis communis*, *Brassica oleracea*, *Arabidopsis thaliana*, *Ananas comosus*, *Ananas ananas*, *Bromelia comosa*, *Carica papaya*, *Cannabis sativa*, *Ipomoea batatas*, *Ipomoea pandurata*, *Convolvulus batatas*, *Convolvulus tiliaceus*, *Ipomoea fastigiata*, *Ipomoea tiliacea*, *Ipomoea triloba*, *Convolvulus panduratus*, *Beta vulgaris*, *Beta vulgaris* var. *altissima*, *Beta vulgaris* var. *vulgaris*, *Beta maritima*, *Beta vulgaris* var. *perennis*, *Beta vulgaris* var. *conditiva*, *Beta vulgaris* var. *esculenta*, *Cucurbita maxima*, *Cucurbita mixta*, *Cucurbita pepo*, *Cucurbita moschata*, *Olea europaea*, *Manihot utilissima*, *Manihot*, *Jatropha manihot*, *Manihot aipil*, *Manihot dulcis*, *Manihot manihot*, *Manihot melanobasis*, *Manihot esculenta*, *Ricinus communis*, *Pisum sativum*, *Pisum arvense*, *Pisum humile*, *Medicago sativa*, *Medicago falcata*, *Medicago varia*, *Glycine max* *Dolichos soja*, *Glycine gracilis*, *Glycine hispida*, *Phaseolus max*, *Soja hispida*, *Soja max*, *Cocos nucifera*, *Pelargonium grossularioides*, *Oleum cocoas*, *Laurus nobilis*, *Persea americana*, *Arachis hypogaea*, *Linum usitatissimum*, *Linum humile*, *Linum austriacum*, *Linum bienne*, *Linum angustifolium*, *Linum catharticum*, *Linum flavum*, *Linum grandiflorum*, *Adenolinum grandiflorum*, *Linum lewisii*, *Linum narbonense*, *Linum perenne*, *Linum perenne* var. *lewisii*, *Linum pratense*, *Linum trigynum*, *Punica granatum*, *Gossypium hirsutum*, *Gossypium arboreum*, *Gossypium barbadense*, *Gossypium herbaceum*, *Gossypium thurberi*, *Musa nana*, *Musa acuminata*, *Musa paradisiaca*, *Musa* spp., *Elaeis guineensis*, *Papaver orientale*, *Papaver rhoeas*, *Papaver dubium*, *Sesamum indicum*, *Piper aduncum*, *Piper amalago*, *Piper angustifolium*, *Piper auritum*, *Piper betel*, *Piper cubeba*, *Piper longum*, *Piper nigrum*, *Piper retrofractum*, *Artanthe adunca*, *Artanthe elongata*, *Peperomia elongata*, *Piper elongatum*, *Steffensia elongata*, *Hordeum vulgare*, *Hordeum jubatum*, *Hordeum murinum*, *Hordeum secalinum*, *Hordeum distichon* *Hordeum aegiceras*, *Hordeum hexastichon*, *Hordeum hexastichum*, *Hordeum irregulare*, *Hordeum sativum*, *Hordeum secalinum*, *Avena sativa*, *Avena fatua*, *Avena byzantina*, *Avena fatua* var. *sativa*, *Avena hybrida*, *Sorghum bicolor*, *Sorghum halepense*, *Sorghum saccharatum*, *Sorghum vulgare*, *Andropogon drummondii*, *Holcus bicolor*, *Holcus sorghum*, *Sorghum aethiopicum*, *Sorghum arundinaceum*, *Sorghum caffrorum*, *Sorghum cernuum*, *Sorghum dochna*, *Sorghum drummondii*, *Sorghum durra*, *Sorghum guineense*, *Sorghum lanceolatum*, *Sorghum nervosum*, *Sorghum saccharatum*, *Sorghum subglabrescens*, *Sorghum verticilliflorum*, *Sorghum vulgare*, *Holcus halepensis*, *Sorghum miliaceum* millet, *Panicum miliaceum*, *Zea mays*, *Triticum aestivum*, *Triticum*

- durum*, *Triticum turgidum*, *Triticum hybernum*, *Triticum macha*, *Triticum sativum* or *Triticum vulgare*, *Cofea spp.*, *Coffea arabica*, *Coffea canephora*, *Coffea liberica*, *Capsicum annuum*, *Capsicum annuum* var. *glabriusculum*, *Capsicum frutescens*, *Capsicum annuum*, *Nicotiana tabacum*, *Solanum tuberosum*, *Solanum melongena*,
 5 *Lycopersicon esculentum*, *Lycopersicon lycopersicum*., *Lycopersicon pyriforme*, *Solanum integrifolium*, *Solanum lycopersicum* *Theobroma cacao* or *Camellia sinensis*.

- [0130.0.0.0] In one embodiment, the nucleic acid molecule sequence originates advantageously from a microorganism as mentioned above under host organism such as a fungus for example the genera *Aspergillus*, *Penicillium* or *Claviceps* or from yeasts
 10 such as the genera *Pichia*, *Torulopsis*, *Hansenula*, *Schizosaccharomyces*, *Candida*, *Rhodotorula* or *Saccharomyces*, very especially advantageously from the yeast of the family *Saccharomycetaceae*, such as the advantageous genus *Saccharomyces* and the very advantageous genus and species *Saccharomyces cerevisiae* for the production of the fine chemical in microorganisms.

- 15 [0131.0.0.0] The skilled worker knows other suitable sources for the production of fine chemicals, which present also useful nucleic acid molecule sources. They include in general all prokaryotic or eukaryotic cells, preferably unicellular microorganisms, such as fungi like the genus *Claviceps* or *Aspergillus* or gram-positive bacteria such as the genera *Bacillus*, *Corynebacterium*, *Micrococcus*, *Brevibacterium*, *Rhodococcus*,
 20 *Nocardia*, *Caseobacter* or *Arthrobacter* or gram-negative bacteria such as the genera *Escherichia*, *Flavobacterium* or *Salmonella*, or yeasts such as the genera *Rhodotorula*, *Hansenula* or *Candida*.

- [0132.0.0.0] Production strains which are especially advantageously selected in the process according to the invention are microorganisms selected from the group of the
 25 families *Actinomycetaceae*, *Bacillaceae*, *Brevibacteriaceae*, *Corynebacteriaceae*, *Enterobacteriaceae*, *Gordoniaceae*, *Micrococcaceae*, *Mycobacteriaceae*, *Nocardiaceae*, *Pseudomonaceae*, *Rhizobiaceae*, *Streptomycetaceae*, *Chaetomiaceae*, *Choanephoraceae*, *Cryptococcaceae*, *Cunninghamellaceae*, *Dematiaceae*, *Moniliaceae*, *Mortierellaceae*, *Mucoraceae*, *Pythiaceae*, *Saccharomycetaceae*,
 30 *Saprolegniaceae*, *Schizosaccharomycetaceae*, *Sodariaceae*, *Sporobolomycetaceae*, *Tuberculariaceae*, *Adelotheciaceae*, *Dinophyceae*, *Ditrichaceae* and *Prasinophyceae* or of the genera and species consisting of *Hansenula anomala*, *Candida utilis*, *Claviceps purpurea*, *Bacillus circulans*, *Bacillus subtilis*, *Bacillus sp.*, *Brevibacterium albidum*, *Brevibacterium album*, *Brevibacterium cerinum*, *Brevibacterium flavum*, *Brevibacterium glutamigenes*, *Brevibacterium iodinum*, *Brevibacterium ketoglutamicum*,
 35 *Brevibacterium lactofermentum*, *Brevibacterium linens*, *Brevibacterium roseum*, *Brevibacterium saccharolyticum*, *Brevibacterium sp.*, *Corynebacterium acetoacidophilum*, *Corynebacterium acetoglutamicum*, *Corynebacterium ammoniagenes*, *Corynebacterium glutamicum* (= *Micrococcus glutamicum*), *Coryne-*

bacterium melassecola, Corynebacterium sp. or Escherichia coli, specifically Escherichia coli K12 and its described strains.

[0133.0.0.0] However, it is also possible to use artificial sequences, which differ in one or more bases (= nucleotides) from the nucleic acid sequences found in organisms, or in one or more amino acid molecules from polypeptide sequences found in organisms, in particular from the polypeptide sequences as depicted in SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394 or the functional homologues thereof as described herein, preferably conferring above-mentioned biological activity, i.e. conferring the fine chemical increase after increasing its activity, e.g. having the biological activity represented by a protein as depicted in SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394.

[0134.0.0.0] In the process according to the invention nucleic acid sequences can be used, which, if appropriate, contain synthetic, non-natural or modified nucleotide bases, which can be incorporated into DNA or RNA. Said synthetic, non-natural or modified bases can for example increase the stability of the nucleic acid molecule outside or inside a cell. The nucleic acid molecules of the invention can contain the same modifications as aforementioned.

[0135.0.0.0] As used in the present context the term "nucleic acid molecule" may also encompass the untranslated sequence located at the 3' and at the 5' end of the coding gene region, for example at least 500, preferably 200, especially preferably 100,

nucleotides of the sequence upstream of the 5' end of the coding region and at least 100, preferably 50, especially preferably 20, nucleotides of the sequence downstream of the 3' end of the coding gene region. It is often advantageous only to choose the coding region for cloning and expression purposes.

- 5 **[0136.0.0.0]** Preferably, the nucleic acid molecule used in the process according to the invention or the nucleic acid molecule of the invention is an isolated nucleic acid molecule.

- 10 **[0137.0.0.0]** An "isolated" polynucleotide or nucleic acid molecule is separated from other polynucleotides or nucleic acid molecules, which are present in the natural source of the nucleic acid molecule. An isolated nucleic acid molecule may be a chromosomal fragment of several kb, or preferably, a molecule only comprising the coding region of the gene. Accordingly, an isolated nucleic acid molecule of the invention may comprise chromosomal regions, which are adjacent 5' and 3' or further adjacent chromosomal regions, but preferably comprises no such sequences which
15 naturally flank the nucleic acid molecule sequence in the genomic or chromosomal context in the organism from which the nucleic acid molecule originates (for example sequences which are adjacent to the regions encoding the 5'- and 3'-UTRs of the nucleic acid molecule). In various embodiments, the isolated nucleic acid molecule used in the process according to the invention may, for example comprise less than
20 approximately 5 kb, 4 kb, 3 kb, 2 kb, 1 kb, 0.5 kb or 0.1 kb nucleotide sequences which naturally flank the nucleic acid molecule in the genomic DNA of the cell from which the nucleic acid molecule originates.

- [0138.0.0.0]** The nucleic acid molecules used in the process, for example the polynucleotides of the invention or of a part thereof can be isolated using molecular-
25 biological standard techniques and the sequence information provided herein. Also, for example a homologous sequence or homologous, conserved sequence regions at the DNA or amino acid level can be identified with the aid of comparison algorithms. The former can be used as hybridization probes under standard hybridization techniques (for example those described in Sambrook et al., Molecular Cloning: A Laboratory
30 Manual. 2nd Ed., Cold Spring Harbor Laboratory, Cold Spring Harbor Laboratory Press, Cold Spring Harbor, NY, 1989) for isolating further nucleic acid sequences useful in this process.

- [0139.0.0.0]** A nucleic acid molecule encompassing a complete sequence of the nucleic acid molecules used in the process, for example the polynucleotide of the
35 invention, or a part thereof may additionally be isolated by polymerase chain reaction, oligonucleotide primers based on this sequence or on parts thereof being used. For example, a nucleic acid molecule comprising the complete sequence or part thereof can be isolated by polymerase chain reaction using oligonucleotide primers which have been generated on the basis of this sequence for example, mRNA can be isolated from

cells (for example by means of the guanidinium thiocyanate extraction method of Chirgwin et al. (1979) Biochemistry 18:5294-5299) and cDNA can be generated by means of reverse transcriptase (for example Moloney MLV reverse transcriptase, available from Gibco/BRL, Bethesda, MD, or AMV reverse transcriptase, obtainable from Seikagaku America, Inc., St.Petersburg, FL).

[0140.0.0.0] Synthetic oligonucleotide primers for the amplification, e.g. as shown in SEQ ID NO: 53, SEQ ID NO: 54, SEQ ID NO: 395 or SEQ ID NO: 396, by means of polymerase chain reaction can be generated on the basis of a sequence shown herein, for example the sequence as depicted in SEQ ID NO: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, 43, 45, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83, 85, 87, 89, 91, 93, 95, 97, 99, 101, 103, 105, 107, 109, 111, 113, 115, 117, 119, 121, 123, 125, 127, 129, 131, 133, 135, 137, 139, 141, 143, 145, 147, 149, 151, 153, 155, 157, 159, 161, 163, 165, 167, 169, 171, 173, 175, 177, 179, 181, 183, 185, 187, 189, 191, 193, 195, 197, 199, 201, 203, 205, 207, 209, 211, 213, 215, 217, 219, 221, 223, 225, 227, 229, 231, 233, 235, 237, 239, 241, 243, 245, 247, 249, 251, 253, 255, 257, 259, 261, 263, 265, 267, 269, 271, 273, 275, 277, 279, 281, 283, 285, 287, 289, 291, 293, 295, 297, 299, 301, 303, 305, 307, 309, 311, 313, 315, 317, 319, 321, 323, 325, 327, 329, 331, 333, 335, 337, 339, 341, 343, 345, 347, 349, 351, 353, 355, 357, 359, 361, 363, 365, 367, 369, 371, 373, 375, 377, 379, 381, 383, 385, 387, 389, 391 or 393.

[0141.0.0.0] Moreover, it is possible to identify conserved regions from various organisms by carrying out protein sequence alignments with the polypeptide used in the process of the invention, in particular with sequences of the polypeptide of the invention, from which conserved regions, and in turn, degenerate primers can be derived. Conserved regions are those, which show a very little variation in the amino acid in one particular position of several homologs from different origin. The consensus sequences as depicted in SEQ ID NO: 47, SEQ ID NO: 48, SEQ ID NO: 49, SEQ ID NO: 50, SEQ ID NO: 51, SEQ ID NO: 52, SEQ ID NO: 397, SEQ ID NO: 398, SEQ ID NO: 399 and/or SEQ ID NO: 400 are derived from said alignments.

[0142.0.0.0] Degenerated primers can then be utilized by PCR for the amplification of fragments of novel proteins having above-mentioned activity, e.g. conferring the increase of the fine chemical after increasing the expression or activity or having the biological activity represented by a protein as depicted in SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278,

280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394 or further functional homologs of the polypeptide of
5 the invention from other organisms.

[0143.0.0.0] These fragments can then be utilized as hybridization probe for isolating the complete gene sequence. As an alternative, the missing 5' and 3' sequences can be isolated by means of RACE-PCR (rapid amplification of cDNA ends). A nucleic acid molecule according to the invention can be amplified using cDNA or, as an alternative,
10 genomic DNA as template and suitable oligonucleotide primers, following standard PCR amplification techniques. The nucleic acid molecule amplified thus can be cloned into a suitable vector and characterized by means of DNA sequence analysis. Oligonucleotides, which correspond to one of the nucleic acid molecules used in the process can be generated by standard synthesis methods, for example using an
15 automatic DNA synthesizer.

[0144.0.0.0] Nucleic acid molecules which are advantageously for the process according to the invention can be isolated based on their homology to the nucleic acid molecules disclosed herein using the sequences or part thereof as hybridization probe and following standard hybridization techniques under stringent hybridization
20 conditions. In this context, it is possible to use, for example, isolated nucleic acid molecules of at least 15, 20, 25, 30, 35, 40, 50, 60 or more nucleotides, preferably of at least 15, 20 or 25 nucleotides in length which hybridize under stringent conditions with the above-described nucleic acid molecules, in particular with those which encompass a nucleotide sequence of the nucleic acid molecule used in the process of the invention or encoding a protein used in the invention or of the nucleic acid molecule of the
25 invention. Nucleic acid molecules with 30, 50, 100, 250 or more nucleotides may also be used.

[0145.0.0.0] The term "homology" means that the respective nucleic acid molecules or encoded proteins are functionally and/or structurally equivalent. The nucleic acid molecules that are homologous to the nucleic acid molecules described above and that are derivatives of said nucleic acid molecules are, for example, variations of said nucleic acid molecules which represent modifications having the same biological function, in particular encoding proteins with the same or substantially the same biological function. They may be naturally occurring variations, such as sequences
30 from other plant varieties or species, or mutations. These mutations may occur naturally or may be obtained by mutagenesis techniques. The allelic variations may be naturally occurring allelic variants as well as synthetically produced or genetically engineered variants. Structurally equivalents can, for example, be identified by testing the binding of said polypeptide to antibodies or computer based predictions.

Structurally equivalent have the similar immunological characteristic, e.g. comprise similar epitopes.

5 [0146.0.0.0] By "hybridizing" it is meant that such nucleic acid molecules hybridize under conventional hybridization conditions, preferably under stringent conditions such as described by, e.g., Sambrook (Molecular Cloning; A Laboratory Manual, 2nd Edition, Cold Spring Harbor Laboratory Press, Cold Spring Harbor, NY (1989)) or in Current Protocols in Molecular Biology, John Wiley & Sons, N. Y. (1989), 6.3.1-6.3.6.

10 [0147.0.0.0] According to the invention, DNA as well as RNA molecules of the nucleic acid of the invention can be used as probes. Further, as template for the identification of functional homologues Northern blot assays as well as Southern blot assays can be performed. The Northern blot assay advantageously provides further informations about the expressed gene product: e.g. expression pattern, occurrence of processing steps, like splicing and capping, etc. The Southern blot assay provides additional information about the chromosomal localization and organization of the gene
15 encoding the nucleic acid molecule of the invention.

[0148.0.0.0] A preferred, nonlimiting example of stringent hybridization conditions are hybridizations in 6 x sodium chloride/sodium citrate (= SSC) at approximately 45°C, followed by one or more wash steps in 0.2 x SSC, 0.1% SDS at 50 to 65°C, for example at 50°C, 55°C or 60°C. The skilled worker knows that these hybridization
20 conditions differ as a function of the type of the nucleic acid and, for example when organic solvents are present, with regard to the temperature and concentration of the buffer. The temperature under "standard hybridization conditions" differs for example as a function of the type of the nucleic acid between 42°C and 58°C, preferably between 45°C and 50°C in an aqueous buffer with a concentration of 0.1 x 0.5 x, 1 x, 2x, 3x, 4x or 5 x SSC (pH 7.2). If organic solvent(s) is/are present in the
25 abovementioned buffer, for example 50% formamide, the temperature under standard conditions is approximately 40°C, 42°C or 45°C. The hybridization conditions for DNA:DNA hybrids are preferably for example 0.1 x SSC and 20°C, 25°C, 30°C, 35°C, 40°C or 45°C, preferably between 30°C and 45°C. The hybridization conditions for
30 DNA:RNA hybrids are preferably for example 0.1 x SSC and 30°C, 35°C, 40°C, 45°C, 50°C or 55°C, preferably between 45°C and 55°C. The abovementioned hybridization temperatures are determined for example for a nucleic acid approximately 100 bp (= base pairs) in length and a G + C content of 50% in the absence of formamide. The skilled worker knows to determine the hybridization conditions required with the aid of
35 textbooks, for example the ones mentioned above, or from the following textbooks: Sambrook et al., "Molecular Cloning", Cold Spring Harbor Laboratory, 1989; Hames and Higgins (Ed.) 1985, "Nucleic Acids Hybridization: A Practical Approach", IRL Press at Oxford University Press, Oxford; Brown (Ed.) 1991, "Essential Molecular Biology: A Practical Approach", IRL Press at Oxford University Press, Oxford.

[0149.0.0.0] A further example of one such stringent hybridization condition is hybridization at 4XSSC at 65°C, followed by a washing in 0.1XSSC at 65°C for one hour. Alternatively, an exemplary stringent hybridization condition is in 50 % formamide, 4XSSC at 42°C. Further, the conditions during the wash step can be
5 selected from the range of conditions delimited by low-stringency conditions (approximately 2X SSC at 50°C) and high-stringency conditions (approximately 0.2X SSC at 50°C, preferably at 65°C) (20X SSC: 0.3M sodium citrate, 3M NaCl, pH 7.0). In addition, the temperature during the wash step can be raised from low-stringency conditions at room temperature, approximately 22°C, to higher-stringency conditions at
10 approximately 65°C. Both of the parameters salt concentration and temperature can be varied simultaneously; or else one of the two parameters can be kept constant while only the other is varied. Denaturants, for example formamide or SDS, may also be employed during the hybridization. In the presence of 50% formamide, hybridization is preferably effected at 42°C. Relevant factors like i) length of treatment, ii) salt
15 conditions, iii) detergent conditions, iv) competitor DNAs, v) temperature and vi) probe selection can be combined case by case so that not all possibilities can be mentioned herein.

Thus, in a preferred embodiment, Northern blots are prehybridized with Rothi-Hybri-Quick buffer (Roth, Karlsruhe) at 68°C for 2h. Hybridization with radioactive labelled
20 probe is done overnight at 68°C. Subsequent washing steps are performed at 68°C with 1xSSC.

For Southern blot assays the membrane is prehybridized with Rothi-Hybri-Quick buffer (Roth, Karlsruhe) at 68°C for 2h. The hybridization with radioactive labelled probe is conducted over night at 68°C. Subsequently the hybridization buffer is discarded and
25 the filter shortly washed using 2xSSC; 0,1% SDS. After discarding the washing buffer new 2xSSC; 0,1% SDS buffer is added and incubated at 68°C for 15 minutes. This washing step is performed twice followed by an additional washing step using 1xSSC; 0,1% SDS at 68°C for 10 min.

[0150.0.0.0] Some further examples of conditions for DNA hybridization (Southern blot assays) and wash step are shown hereinbelow:
30

- (1) Hybridization conditions can be selected, for example, from the following conditions:
 - a) 4X SSC at 65°C,
 - b) 6X SSC at 45°C,
 - 35 c) 6X SSC, 100 mg/ml denatured fragmented fish sperm DNA at 68°C,
 - d) 6X SSC, 0.5% SDS, 100 mg/ml denatured salmon sperm DNA at 68°C,
 - e) 6X SSC, 0.5% SDS, 100 mg/ml denatured fragmented salmon sperm DNA, 50% formamide at 42°C,
 - f) 50% formamide, 4X SSC at 42°C,

- g) 50% (vol/vol) formamide, 0.1% bovine serum albumin, 0.1% Ficoll, 0.1% polyvinylpyrrolidone, 50 mM sodium phosphate buffer pH 6.5, 750 mM NaCl, 75 mM sodium citrate at 42°C,
- h) 2X or 4X SSC at 50°C (low-stringency condition), or
- 5 i) 30 to 40% formamide, 2X or 4X SSC at 42°C (low-stringency condition).

(2) Wash steps can be selected, for example, from the following conditions:

- a) 0.015 M NaCl/0.0015 M sodium citrate/0.1% SDS at 50°C.
- b) 0.1X SSC at 65°C.
- 10 c) 0.1X SSC, 0.5 % SDS at 68°C.
- d) 0.1X SSC, 0.5% SDS, 50% formamide at 42°C.
- e) 0.2X SSC, 0.1% SDS at 42°C.
- f) 2X SSC at 65°C (low-stringency condition).

[0151.0.0.0] Polypeptides having above-mentioned biological activity, i.e. conferring the fine chemical increase, derived from other organisms, can be encoded by other DNA sequences which hybridize to the sequences shown in SEQ ID NO: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, 43, 45, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83, 85, 87, 89, 91, 93, 95, 97, 99, 101, 103, 105, 107, 109, 111, 113, 115, 117, 119, 121, 123, 125, 127, 129, 131, 133, 135, 137, 139, 141, 143, 145, 147, 149, 151, 153, 155, 157, 159, 161, 163, 165, 167, 169, 171, 173, 175, 177, 179, 181, 183, 185, 187, 189, 191, 193, 195, 197, 199, 201, 203, 205, 207, 209, 211, 213, 215, 217, 219, 221, 223, 225, 227, 229, 231, 233, 235, 237, 239, 241, 243, 245, 247, 249, 251, 253, 255, 257, 259, 261, 263, 265, 267, 269, 271, 273, 275, 277, 279, 281, 283, 285, 287, 289, 291, 293, 295, 297, 299, 301, 303, 305, 307, 309, 311, 25 313, 315, 317, 319, 321, 323, 325, 327, 329, 331, 333, 335, 337, 339, 341, 343, 345, 347, 349, 351, 353, 355, 357, 359, 361, 363, 365, 367, 369, 371, 373, 375, 377, 379, 381, 383, 385, 387, 389, 391 or 393 under relaxed hybridization conditions and which code on expression for peptides having the fine chemical increasing activity.

[0152.0.0.0] Further, some applications have to be performed at low stringency hybridisation conditions, without any consequences for the specificity of the hybridisation. For example, a Southern blot analysis of total DNA could be probed with a nucleic acid molecule of the present invention and washed at low stringency (55°C in 2xSSPE0, 1% SDS). The hybridisation analysis could reveal a simple pattern of only genes encoding polypeptides of the present invention or used in the process of the invention, e.g. having herein-mentioned activity of increasing the fine chemical. A further example of such low-stringent hybridization conditions is 4XSSC at 50°C or hybridization with 30 to 40% formamide at 42°C. Such molecules comprise those which are fragments, analogues or derivatives of the polypeptide of the invention or used in the process of the invention and differ, for example, by way of amino acid and/or nucleotide deletion(s), insertion(s), substitution (s), addition(s) and/or recombination (s) 40 or any other modification(s) known in the art either alone or in combination from the

above-described amino acid sequences or their underlying nucleotide sequence(s). However, it is preferred to use high stringency hybridisation conditions.

5 **[0153.0.0.0]** Hybridization should advantageously be carried out with fragments of at least 5, 10, 15, 20, 25, 30, 35 or 40 bp, advantageously at least 50, 60, 70 or 80 bp, preferably at least 90, 100 or 110 bp. Most preferably are fragments of at least 15, 20, 25 or 30 bp. Preferably are also hybridizations with at least 100 bp or 200, very especially preferably at least 400 bp in length. In an especially preferred embodiment, the hybridization should be carried out with the entire nucleic acid sequence with conditions described above.

10 **[0154.0.0.0]** The terms "fragment", "fragment of a sequence" or "part of a sequence" mean a truncated sequence of the original sequence referred to. The truncated sequence (nucleic acid or protein sequence) can vary widely in length; the minimum size being a sequence of sufficient size to provide a sequence with at least a comparable function and/or biological activity of the original sequence referred to or
15 hybridizing with the nucleic acid molecule of the invention or used in the process of the invention under stringend conditions, while the maximum size is not critical. In some applications, the maximum size usually is not substantially greater than that required to provide the desired activity and/or function(s) of the original sequence.

20 **[0155.0.0.0]** Typically, the truncated amino acid sequence will range from about 5 to about 260 amino acids in length. More typically, however, the sequence will be a maximum of about 220 amino acids in length, preferably a maximum of about 215 or 100 amino acids. It is usually desirable to select sequences of at least about 100, 120 or 150 amino acids, up to a maximum of about 200 or 250 amino acids.

25 **[0156.0.0.0]** The term "epitope" relates to specific immunoreactive sites within an antigen, also known as antigenic determinates. These epitopes can be a linear array of monomers in a polymeric composition – such as amino acids in a protein – or consist of or comprise a more complex secondary or tertiary structure. Those of skill will recognize that immunogens (i.e., substances capable of eliciting an immune response) are antigens; however, some antigen, such as haptens, are not immunogens but may
30 be made immunogenic by coupling to a carrier molecule. The term "antigen" includes references to a substance to which an antibody can be generated and/or to which the antibody is specifically immunoreactive.

35 **[0157.0.0.0]** In one embodiment the present invention relates to a epitope of the polypeptide of the present invention or used in the process of the present invention and conferring above mentioned biological activity, preferably conferring an increase in the fine chemical.

[0158.0.0.0] The term "one or several amino acids" relates to at least one amino acid but not more than that number of amino acids, which would result in a homology of

below 50% identity. Preferably, the identity is more than 70% or 80%, more preferred are 85%, 90%, 91%, 92%, 93%, 94% or 95%, even more preferred are 96%, 97%, 98%, or 99% identity.

[0159.0.0.0] Further, the nucleic acid molecule of the invention comprises a nucleic acid molecule, which is a complement of one of the nucleotide sequences of above mentioned nucleic acid molecules or a portion thereof. A nucleic acid molecule which is complementary to one of the nucleotide sequences as depicted in SEQ ID NO: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41 43, 45, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83, 85, 87, 89, 91, 93, 95, 97, 99, 101, 103, 105, 107, 109, 111, 113, 115, 117, 119, 121, 123, 125, 127, 129, 131, 133, 135, 137, 139, 141, 143, 145, 147, 149, 151, 153, 155, 157, 159, 161, 163, 165, 167, 169, 171, 173, 175, 177, 179, 181, 183, 185, 187, 189, 191, 193, 195, 197, 199, 201, 203, 205, 207, 209, 211, 213, 215, 217, 219, 221, 223, 225, 227, 229, 231, 233, 235, 237, 239, 241, 243, 245, 247, 249, 251, 253, 255, 257, 259, 261, 263, 265, 267, 269, 271, 273, 275, 277, 279, 281, 283, 285, 287, 289, 291, 293, 295, 297, 299, 301, 303, 305, 307, 309, 311, 313, 315, 317, 319, 321, 323, 325, 327, 329, 331, 333, 335, 337, 339, 341, 343, 345, 347, 349, 351, 353, 355, 357, 359, 361, 363, 365, 367, 369, 371, 373, 375, 377, 379, 381, 383, 385, 387, 389, 391 or 393 is one which is sufficiently complementary to one of the nucleotide sequences as depicted in SEQ ID NO: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41 43, 45, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83, 85, 87, 89, 91, 93, 95, 97, 99, 101, 103, 105, 107, 109, 111, 113, 115, 117, 119, 121, 123, 125, 127, 129, 131, 133, 135, 137, 139, 141, 143, 145, 147, 149, 151, 153, 155, 157, 159, 161, 163, 165, 167, 169, 171, 173, 175, 177, 179, 181, 183, 185, 187, 189, 191, 193, 195, 197, 199, 201, 203, 205, 207, 209, 211, 213, 215, 217, 219, 221, 223, 225, 227, 229, 231, 233, 235, 237, 239, 241, 243, 245, 247, 249, 251, 253, 255, 257, 259, 261, 263, 265, 267, 269, 271, 273, 275, 277, 279, 281, 283, 285, 287, 289, 291, 293, 295, 297, 299, 301, 303, 305, 307, 309, 311, 313, 315, 317, 319, 321, 323, 325, 327, 329, 331, 333, 335, 337, 339, 341, 343, 345, 347, 349, 351, 353, 355, 357, 359, 361, 363, 365, 367, 369, 371, 373, 375, 377, 379, 381, 383, 385, 387, 389, 391 or 393 such that it can hybridize to one of the nucleotide sequences as depicted in SEQ ID NO: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41 43, 45, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83, 85, 87, 89, 91, 93, 95, 97, 99, 101, 103, 105, 107, 109, 111, 113, 115, 117, 119, 121, 123, 125, 127, 129, 131, 133, 135, 137, 139, 141, 143, 145, 147, 149, 151, 153, 155, 157, 159, 161, 163, 165, 167, 169, 171, 173, 175, 177, 179, 181, 183, 185, 187, 189, 191, 193, 195, 197, 199, 201, 203, 205, 207, 209, 211, 213, 215, 217, 219, 221, 223, 225, 227, 229, 231, 233, 235, 237, 239, 241, 243, 245, 247, 249, 251, 253, 255, 257, 259, 261, 263, 265, 267, 269, 271, 273, 275, 277, 279, 281, 283, 285, 287, 289, 291, 293, 295, 297, 299, 301, 303, 305, 307, 309, 311, 313, 315, 317, 319, 321, 323, 325, 327, 329, 331, 333, 335, 337, 339, 341, 343, 345, 347, 349, 351, 353, 355, 357, 359, 361, 363, 365, 367, 369, 371, 373, 375, 377, 379, 381, 383, 385, 387, 389, 391 or 393, thereby

forming a stable duplex. Preferably, the hybridisation is performed under stringent hybridization conditions. However, a complement of one of the herein disclosed sequences is preferably a sequence complement thereto according to the base pairing of nucleic acid molecules well known to the skilled person. For example, the bases A and G undergo base pairing with the bases T and U or C, resp. and visa versa. Modifications of the bases can influence the base-pairing partner.

[0160.0.0.0] The nucleic acid molecule of the invention comprises a nucleotide sequence which is at least about 30%, 35%, 40% or 45%, preferably at least about 50%, 55%, 60% or 65%, more preferably at least about 70%, 80%, or 90%, and even more preferably at least about 95%, 97%, 98%, 99% most preferably at least about 99,1%; 99,2%; 99,3%; 99,4%; 99,5%; 99,6%; 99,7%; 99,8% or 99,9% or more homologous to a nucleotide sequence as depicted in SEQ ID NO: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41 43, 45, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83, 85, 87, 89, 91, 93, 95, 97, 99, 101, 103, 105, 107, 109, 111, 113, 115, 117, 119, 121, 123, 125, 127, 129, 131, 133, 135, 137, 139, 141, 143, 145, 147, 149, 151, 153, 155, 157, 159, 161, 163, 165, 167, 169, 171, 173, 175, 177, 179, 181, 183, 185, 187, 189, 191, 193, 195, 197, 199, 201, 203, 205, 207, 209, 211, 213, 215, 217, 219, 221, 223, 225, 227, 229, 231, 233, 235, 237, 239, 241, 243, 245, 247, 249, 251, 253, 255, 257, 259, 261, 263, 265, 267, 269, 271, 273, 275, 277, 279, 281, 283, 285, 287, 289, 291, 293, 295, 297, 299, 301, 303, 305, 307, 309, 311, 313, 315, 317, 319, 321, 323, 325, 327, 329, 331, 333, 335, 337, 339, 341, 343, 345, 347, 349, 351, 353, 355, 357, 359, 361, 363, 365, 367, 369, 371, 373, 375, 377, 379, 381, 383, 385, 387, 389, 391 or 393, or a portion thereof and preferably has above mentioned biological activity, in particular having a fine chemical increasing activity after increasing the biological activity of a protein having the biological activity represented by a protein as depicted in SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394 and their respective gene products.

[0161.0.0.0] The nucleic acid molecule of the invention comprises a nucleotide sequence which hybridizes, preferably hybridizes under stringent conditions as defined herein, to one of the nucleotide sequences as depicted in SEQ ID NO: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41 43, 45, 55, 57, 59, 61, 63, 65,

67, 69, 71, 73, 75, 77, 79, 81, 83, 85, 87, 89, 91, 93, 95, 97, 99, 101, 103, 105, 107, 109, 111, 113, 115, 117, 119, 121, 123, 125, 127, 129, 131, 133, 135, 137, 139, 141, 143, 145, 147, 149, 151, 153, 155, 157, 159, 161, 163, 165, 167, 169, 171, 173, 175, 177, 179, 181, 183, 185, 187, 189, 191, 193, 195, 197, 199, 201, 203, 205, 207, 209, 211, 213, 215, 217, 219, 221, 223, 225, 227, 229, 231, 233, 235, 237, 239, 241, 243, 245, 247, 249, 251, 253, 255, 257, 259, 261, 263, 265, 267, 269, 271, 273, 275, 277, 279, 281, 283, 285, 287, 289, 291, 293, 295, 297, 299, 301, 303, 305, 307, 309, 311, 313, 315, 317, 319, 321, 323, 325, 327, 329, 331, 333, 335, 337, 339, 341, 343, 345, 347, 349, 351, 353, 355, 357, 359, 361, 363, 365, 367, 369, 371, 373, 375, 377, 379, 381, 383, 385, 387, 389, 391 or 393, or a portion thereof and encodes a protein having above-mentioned biological activity, e.g. conferring the fine chemical increase, and optionally, having the biological activity of YNL090W.

[0162.0.0.0] Moreover, the nucleic acid molecule of the invention can comprise only a portion of the coding region of one of the sequences in SEQ ID NO: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, 43, 45, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83, 85, 87, 89, 91, 93, 95, 97, 99, 101, 103, 105, 107, 109, 111, 113, 115, 117, 119, 121, 123, 125, 127, 129, 131, 133, 135, 137, 139, 141, 143, 145, 147, 149, 151, 153, 155, 157, 159, 161, 163, 165, 167, 169, 171, 173, 175, 177, 179, 181, 183, 185, 187, 189, 191, 193, 195, 197, 199, 201, 203, 205, 207, 209, 211, 213, 215, 217, 219, 221, 223, 225, 227, 229, 231, 233, 235, 237, 239, 241, 243, 245, 247, 249, 251, 253, 255, 257, 259, 261, 263, 265, 267, 269, 271, 273, 275, 277, 279, 281, 283, 285, 287, 289, 291, 293, 295, 297, 299, 301, 303, 305, 307, 309, 311, 313, 315, 317, 319, 321, 323, 325, 327, 329, 331, 333, 335, 337, 339, 341, 343, 345, 347, 349, 351, 353, 355, 357, 359, 361, 363, 365, 367, 369, 371, 373, 375, 377, 379, 381, 383, 385, 387, 389, 391 or 393, for example a fragment which can be used as a probe or primer or a fragment encoding a biologically active portion of the polypeptide of the present invention or of a polypeptide used in the process of the present invention, i.e. having above-mentioned activity, e.g. conferring an increase of methionine if its activity is increased. The nucleotide sequences determined from the cloning of the present protein-according-to-the-invention-encoding gene allows for the generation of probes and primers designed for use in identifying and/or cloning its homologues in other cell types and organisms. The probe/primer typically comprises substantially purified oligonucleotide. The oligonucleotide typically comprises a region of nucleotide sequence that hybridizes under stringent conditions to at least about 12, 15 preferably about 20 or 25, more preferably about 40, 50 or 75 consecutive nucleotides of a sense strand of one of the sequences set forth, e.g., in SEQ ID NO: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, 43, 45, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83, 85, 87, 89, 91, 93, 95, 97, 99, 101, 103, 105, 107, 109, 111, 113, 115, 117, 119, 121, 123, 125, 127, 129, 131, 133, 135, 137, 139, 141, 143, 145, 147, 149, 151, 153, 155, 157, 159, 161, 163, 165, 167, 169, 171, 173, 175, 177, 179, 181, 183, 185, 187, 189, 191, 193, 195, 197, 199, 201, 203,

205, 207, 209, 211, 213, 215, 217, 219, 221, 223, 225, 227, 229, 231, 233, 235, 237, 239, 241, 243, 245, 247, 249, 251, 253, 255, 257, 259, 261, 263, 265, 267, 269, 271, 273, 275, 277, 279, 281, 283, 285, 287, 289, 291, 293, 295, 297, 299, 301, 303, 305, 307, 309, 311, 313, 315, 317, 319, 321, 323, 325, 327, 329, 331, 333, 335, 337, 339, 341, 343, 345, 347, 349, 351, 353, 355, 357, 359, 361, 363, 365, 367, 369, 371, 373, 375, 377, 379, 381, 383, 385, 387, 389, 391 or 393, an anti-sense sequence of one of the sequences, e.g., set forth in SEQ ID NO: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, 43, 45, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83, 85, 87, 89, 91, 93, 95, 97, 99, 101, 103, 105, 107, 109, 111, 113, 115, 117, 119, 121, 123, 125, 127, 129, 131, 133, 135, 137, 139, 141, 143, 145, 147, 149, 151, 153, 155, 157, 159, 161, 163, 165, 167, 169, 171, 173, 175, 177, 179, 181, 183, 185, 187, 189, 191, 193, 195, 197, 199, 201, 203, 205, 207, 209, 211, 213, 215, 217, 219, 221, 223, 225, 227, 229, 231, 233, 235, 237, 239, 241, 243, 245, 247, 249, 251, 253, 255, 257, 259, 261, 263, 265, 267, 269, 271, 273, 275, 277, 279, 281, 283, 285, 287, 289, 291, 293, 295, 297, 299, 301, 303, 305, 307, 309, 311, 313, 315, 317, 319, 321, 323, 325, 327, 329, 331, 333, 335, 337, 339, 341, 343, 345, 347, 349, 351, 353, 355, 357, 359, 361, 363, 365, 367, 369, 371, 373, 375, 377, 379, 381, 383, 385, 387, 389, 391 or 393, or naturally occurring mutants thereof. Primers based on a nucleotide of invention can be used in PCR reactions to clone homologues of the polypeptide of the invention or of the polypeptide used in the process of the invention, e.g. as the primers described in the examples of the present invention, e.g. as shown in the examples. A PCR with the primers shown in SEQ ID NO: 53, SEQ ID NO: 54, SEQ ID NO: 395 or SEQ ID NO: 396 will at least result in a fragment of gene products as depicted in the sequences SEQ ID NO: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, 43, 45, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83, 85, 87, 89, 91, 93, 95, 97, 99, 101, 103, 105, 107, 109, 111, 113, 115, 117, 119, 121, 123, 125, 127, 129, 131, 133, 135, 137, 139, 141, 143, 145, 147, 149, 151, 153, 155, 157, 159, 161, 163, 165, 167, 169, 171, 173, 175, 177, 179, 181, 183, 185, 187, 189, 191, 193, 195, 197, 199, 201, 203, 205, 207, 209, 211, 213, 215, 217, 219, 221, 223, 225, 227, 229, 231, 233, 235, 237, 239, 241, 243, 245, 247, 249, 251, 253, 255, 257, 259, 261, 263, 265, 267, 269, 271, 273, 275, 277, 279, 281, 283, 285, 287, 289, 291, 293, 295, 297, 299, 301, 303, 305, 307, 309, 311, 313, 315, 317, 319, 321, 323, 325, 327, 329, 331, 333, 335, 337, 339, 341, 343, 345, 347, 349, 351, 353, 355, 357, 359, 361, 363, 365, 367, 369, 371, 373, 375, 377, 379, 381, 383, 385, 387, 389, 391 or 393.

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[0163.0.0.0] Primer sets are interchangeable. The person skilled in the art knows to combine said primers to result in the desired product, e.g. in a full-length clone or a partial sequence. Probes based on the sequences of the nucleic acid molecule of the invention or used in the process of the present invention can be used to detect transcripts or genomic sequences encoding the same or homologous proteins. The probe can further comprise a label group attached thereto, e.g. the label group can be a radioisotope, a fluorescent compound, an enzyme, or an enzyme co-factor. Such

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probes can be used as a part of a genomic marker test kit for identifying cells which express an polypeptide of the invention or used in the process of the present invention, such as by measuring a level of an encoding nucleic acid molecule in a sample of cells, e.g., detecting mRNA levels or determining, whether a genomic gene comprising the sequence of the polynucleotide of the invention or used in the processs of the present invention has been mutated or deleted.

[0164.0.0.0] The nucleic acid molecule of the invention encodes a polypeptide or portion thereof which includes an amino acid sequence which is sufficiently homologous to the amino acid sequence as depicted in SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394 such that the protein or portion thereof maintains the ability to participate in the fine chemical production, in particular an amino acid increasing activity as mentioned above or as described in the examples in plants or microorganisms is comprised.

[0165.0.0.0] As used herein, the language "sufficiently homologous" refers to proteins or portions thereof which have amino acid sequences which include a minimum number of identical or equivalent amino acid residues (e.g., an amino acid residue which has a similar side chain as an amino acid residue in one of the sequences of the polypeptide of the present invention) to an amino acid sequence as depicted in SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394 such that the protein or portion thereof is able to participate in the increase of the fine chemical production. For examples having the biological activity represented by a protein as

depicted in SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394 are described herein.

[0166.0.0.0] In one embodiment, the nucleic acid molecule of the present invention comprises a nucleic acid that encodes a portion of the protein of the present invention. The protein is at least about 30%, 35%, 40%, 45% or 50%, preferably at least about 55%, 60%, 65% or 70%, and more preferably at least about 75%, 80%, 85%, 90%, 91%, 92%, 93% or 94% and most preferably at least about 95%, 97%, 98%, 99% or more homologous to an entire amino acid sequence of SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394 and having above-mentioned activity, e.g. conferring preferably the increase of the fine chemical.

[0167.0.0.0] Portions of proteins encoded by the nucleic acid molecule of the invention are preferably biologically active, preferably having above-mentioned annotated activity, e.g. conferring an increase of the fine chemical after increase of activity.

[0168.0.0.0] As mentioned herein, the term "biologically active portion" is intended to include a portion, e.g., a domain/motif, that confers increase of the fine chemical or has an immunological activity such that it binds to an antibody binding specifically to the polypeptide of the present invention or a polypeptide used in the process of the present invention for producing the fine chemical;

[0169.0.0.0] The invention further relates to nucleic acid molecules that differ from one of the nucleotide sequences as depicted in SEQ ID NO: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, 43, 45, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83, 85, 87, 89, 91, 93, 95, 97, 99, 101, 103, 105, 107, 109, 111, 113, 115, 117, 119, 121, 123, 125, 127, 129, 131, 133, 135, 137, 139, 141, 143, 145, 147, 149, 151, 153, 155, 157, 159, 161, 163, 165, 167, 169, 171, 173, 175, 177, 179, 181, 183, 185, 187, 189, 191, 193, 195, 197, 199, 201, 203, 205, 207, 209, 211, 213, 215, 217, 219, 221, 223, 225, 227, 229, 231, 233, 235, 237, 239, 241, 243, 245, 247, 249, 251, 253, 255, 257, 259, 261, 263, 265, 267, 269, 271, 273, 275, 277, 279, 281, 283, 285, 287, 289, 291, 293, 295, 297, 299, 301, 303, 305, 307, 309, 311, 313, 315, 317, 319, 321, 323, 325, 327, 329, 331, 333, 335, 337, 339, 341, 343, 345, 347, 349, 351, 353, 355, 357, 359, 361, 363, 365, 367, 369, 371, 373, 375, 377, 379, 381, 383, 385, 387, 389, 391 or 393 (and portions thereof) due to degeneracy of the genetic code and thus encode a polypeptide of the present invention, in particular a polypeptide having above mentioned activity, e.g. conferring an increase in the fine chemical in a organism. Advantageously, the nucleic acid molecule of the invention comprises, or in an other embodiment has, a nucleotide sequence encoding a protein comprising, or in an other embodiment having, an amino acid sequence as depicted in SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394 or the functional homologues. In a still further embodiment, the nucleic acid molecule of the invention encodes a full length protein which is substantially homologous to an amino acid sequence as depicted in SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394 or the functional

homologues. However, in a preferred embodiment, the nucleic acid molecule of the present invention does not consist of the sequence as depicted in SEQ ID NO: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, 43, 45, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83, 85, 87, 89, 91, 93, 95, 97, 99, 101, 103, 105, 107, 109, 111, 113, 115, 117, 119, 121, 123, 125, 127, 129, 131, 133, 135, 137, 139, 141, 143, 145, 147, 149, 151, 153, 155, 157, 159, 161, 163, 165, 167, 169, 171, 173, 175, 177, 179, 181, 183, 185, 187, 189, 191, 193, 195, 197, 199, 201, 203, 205, 207, 209, 211, 213, 215, 217, 219, 221, 223, 225, 227, 229, 231, 233, 235, 237, 239, 241, 243, 245, 247, 249, 251, 253, 255, 257, 259, 261, 263, 265, 267, 269, 271, 273, 275, 277, 279, 281, 283, 285, 287, 289, 291, 293, 295, 297, 299, 301, 303, 305, 307, 309, 311, 313, 315, 317, 319, 321, 323, 325, 327, 329, 331, 333, 335, 337, 339, 341, 343, 345, 347, 349, 351, 353, 355, 357, 359, 361, 363, 365, 367, 369, 371, 373, 375, 377, 379, 381, 383, 385, 387, 389, 391 or 393.

[0170.0.0.0] In addition, it will be appreciated by those skilled in the art that DNA sequence polymorphisms that lead to changes in the amino acid sequences may exist within a population. Such genetic polymorphism in the gene encoding the polypeptide of the invention or comprising the nucleic acid molecule of the invention may exist among individuals within a population due to natural variation.

[0171.0.0.0] As used herein, the terms "gene" and "recombinant gene" refer to nucleic acid molecules comprising an open reading frame encoding the polypeptide of the invention or comprising the nucleic acid molecule of the invention or encoding the polypeptide used in the process of the present invention, preferably from a crop plant or from a microorganism useful for the production of fine chemicals, in particular for the production of the fine chemical. Such natural variations can typically result in 1-5% variance in the nucleotide sequence of the gene. Any and all such nucleotide variations and resulting amino acid polymorphisms in genes encoding a polypeptide of the invention or comprising a the nucleic acid molecule of the invention that are the result of natural variation and that do not alter the functional activity as described are intended to be within the scope of the invention.

[0172.0.0.0] Nucleic acid molecules corresponding to natural variants homologues of a nucleic acid molecule of the invention, which can also be a cDNA, can be isolated based on their homology to the nucleic acid molecules disclosed herein using the nucleic acid molecule of the invention, or a portion thereof, as a hybridization probe according to standard hybridization techniques under stringent hybridization conditions.

[0173.0.0.0] Accordingly, in another embodiment, a nucleic acid molecule of the invention is at least 15, 20, 25 or 30 nucleotides in length. Preferably, it hybridizes under stringent conditions to a nucleic acid molecule comprising a nucleotide sequence of the nucleic acid molecule of the present invention or used in the process of the present invention, e.g. comprising the sequence as depicted in SEQ ID NO: 1, 3, 5, 7,

9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41 43, 45, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83, 85, 87, 89, 91, 93, 95, 97, 99, 101, 103, 105, 107, 109, 111, 113, 115, 117, 119, 121, 123, 125, 127, 129, 131, 133, 135, 137, 139, 141, 143, 145, 147, 149, 151, 153, 155, 157, 159, 161, 163, 165, 167, 169, 171, 173, 175, 177, 179, 181, 183, 185, 187, 189, 191, 193, 195, 197, 199, 201, 203, 205, 207, 209, 211, 213, 215, 217, 219, 221, 223, 225, 227, 229, 231, 233, 235, 237, 239, 241, 243, 245, 247, 249, 251, 253, 255, 257, 259, 261, 263, 265, 267, 269, 271, 273, 275, 277, 279, 281, 283, 285, 287, 289, 291, 293, 295, 297, 299, 301, 303, 305, 307, 309, 311, 313, 315, 317, 319, 321, 323, 325, 327, 329, 331, 333, 335, 337, 339, 341, 343, 345, 347, 349, 351, 353, 355, 357, 359, 361, 363, 365, 367, 369, 371, 373, 375, 377, 379, 381, 383, 385, 387, 389, 391 or 393. The nucleic acid molecule is preferably at least 20, 30, 50, 100, 250 or more nucleotides in length.

[0174.0.0.0] The term "hybridizes under stringent conditions" is defined above. In one embodiment, the term "hybridizes under stringent conditions" is intended to describe conditions for hybridization and washing under which nucleotide sequences at least 30 %, 40 %, 50 % or 65% identical to each other typically remain hybridized to each other. Preferably, the conditions are such that sequences at least about 70%, more preferably at least about 75% or 80%, and even more preferably at least about 85%, 90% or 95% or more identical to each other typically remain hybridized to each other.

[0175.0.0.0] Preferably, nucleic acid molecule of the invention that hybridizes under stringent conditions to a sequence as depicted in SEQ ID NO: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41 43, 45, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83, 85, 87, 89, 91, 93, 95, 97, 99, 101, 103, 105, 107, 109, 111, 113, 115, 117, 119, 121, 123, 125, 127, 129, 131, 133, 135, 137, 139, 141, 143, 145, 147, 149, 151, 153, 155, 157, 159, 161, 163, 165, 167, 169, 171, 173, 175, 177, 179, 181, 183, 185, 187, 189, 191, 193, 195, 197, 199, 201, 203, 205, 207, 209, 211, 213, 215, 217, 219, 221, 223, 225, 227, 229, 231, 233, 235, 237, 239, 241, 243, 245, 247, 249, 251, 253, 255, 257, 259, 261, 263, 265, 267, 269, 271, 273, 275, 277, 279, 281, 283, 285, 287, 289, 291, 293, 295, 297, 299, 301, 303, 305, 307, 309, 311, 313, 315, 317, 319, 321, 323, 325, 327, 329, 331, 333, 335, 337, 339, 341, 343, 345, 347, 349, 351, 353, 355, 357, 359, 361, 363, 365, 367, 369, 371, 373, 375, 377, 379, 381, 383, 385, 387, 389, 391 or 393 corresponds to a naturally-occurring nucleic acid molecule of the invention. As used herein, a "naturally-occurring" nucleic acid molecule refers to an RNA or DNA molecule having a nucleotide sequence that occurs in nature (e.g., encodes a natural protein). Preferably, the nucleic acid molecule encodes a natural protein having above-mentioned activity, e.g. conferring the fine chemical increase after increasing the expression or activity thereof or the activity of a protein of the invention or used in the process of the invention.

[0176.0.0.0] In addition to naturally-occurring variants of thesequences of the polypeptide or nucleic acid molecule of the invention as well as of the polypeptide or

nucleic acid molecule used in the process of the invention that may exist in the population, the skilled artisan will further appreciate that changes can be introduced by mutation into a nucleotide sequence of the nucleic acid molecule encoding the polypeptide of the invention or used in the process of the present invention, thereby leading to changes in the amino acid sequence of the encoded polypeptide, without altering the functional ability of the polypeptide, preferably not decreasing said activity.

[0177.0.0.0] For example, nucleotide substitutions leading to amino acid substitutions at "non-essential" amino acid residues can be made in a sequence of the nucleic acid molecule of the invention or used in the process of the invention, e.g. in SEQ ID NO: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, 43, 45, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83, 85, 87, 89, 91, 93, 95, 97, 99, 101, 103, 105, 107, 109, 111, 113, 115, 117, 119, 121, 123, 125, 127, 129, 131, 133, 135, 137, 139, 141, 143, 145, 147, 149, 151, 153, 155, 157, 159, 161, 163, 165, 167, 169, 171, 173, 175, 177, 179, 181, 183, 185, 187, 189, 191, 193, 195, 197, 199, 201, 203, 205, 207, 209, 211, 213, 215, 217, 219, 221, 223, 225, 227, 229, 231, 233, 235, 237, 239, 241, 243, 245, 247, 249, 251, 253, 255, 257, 259, 261, 263, 265, 267, 269, 271, 273, 275, 277, 279, 281, 283, 285, 287, 289, 291, 293, 295, 297, 299, 301, 303, 305, 307, 309, 311, 313, 315, 317, 319, 321, 323, 325, 327, 329, 331, 333, 335, 337, 339, 341, 343, 345, 347, 349, 351, 353, 355, 357, 359, 361, 363, 365, 367, 369, 371, 373, 375, 377, 379, 381, 383, 385, 387, 389, 391 or 393.

[0178.0.0.0] A "non-essential" amino acid residue is a residue that can be altered from the wild-type sequence of one without altering the activity of said polypeptide, whereas an "essential" amino acid residue is required for an activity as mentioned above, e.g. leading to an increase in the fine chemical in an organism after an increase of activity of the polypeptide. Other amino acid residues, however, (e.g., those that are not conserved or only semi-conserved in the domain having said activity) may not be essential for activity and thus are likely to be amenable to alteration without altering said activity.

[0179.0.0.0] Further, a person skilled in the art knows that the codon usage between organisms can differ. Therefore, he may adapt the codon usage in the nucleic acid molecule of the present invention to the usage of the organism in which the polynucleotide or polypeptide is expressed.

[0180.0.0.0] Accordingly, the invention relates to nucleic acid molecules encoding a polypeptide having above-mentioned biological activity, e.g. conferring an increase in the the fine chemical in an organism or part thereof that contain changes in amino acid residues that are not essential for said activity. Such polypeptides differ in amino acid sequence from a sequence contained in SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114,

116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394 yet retain said activity described herein. The nucleic acid molecule can comprise a nucleotide sequence encoding a polypeptide, wherein the polypeptide comprises an amino acid sequence at least about 50% identical to an amino acid sequence of SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394 and is capable of participation in the increase of production of the fine chemical after increasing its activity, e.g. its expression. Preferably, the protein encoded by the nucleic acid molecule is at least about 60% identical to the sequence in SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394, more preferably at least about 70% identical to one of the sequences in SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216,

- 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394, even more preferably at least about 80%, 90%, 95% homologous to the sequence in SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394, and most preferably at least about 96%, 97%, 98%, or 99% identical to the sequence in SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394.
- 30 **[0181.0.0.0]** To determine the percentage homology (= identity) of two amino acid sequences or of two nucleic acid molecules, the sequences are written one underneath the other for an optimal comparison (for example gaps may be inserted into the sequence of a protein or of a nucleic acid in order to generate an optimal alignment with the other protein or the other nucleic acid).
- 35 **[0182.0.0.0]** The amino acid residues or nucleic acid molecules at the corresponding amino acid positions or nucleotide positions are then compared. If a position in one sequence is occupied by the same amino acid residue or the same nucleic acid molecule as the corresponding position in the other sequence, the molecules are homologous at this position (i.e. amino acid or nucleic acid "homology" as used in the present context corresponds to amino acid or nucleic acid "identity". The percentage
- 40 homology between the two sequences is a function of the number of identical positions

shared by the sequences (i.e. % homology = number of identical positions/total number of positions x 100). The terms "homology" and "identity" are thus to be considered as synonyms.

- [0183.0.0.0]** For the determination of the percentage homology (=identity) of two or more amino acids or of two or more nucleotide sequences several computer software programs have been developed. The homology of two or more sequences can be calculated with for example the software fasta, which presently has been used in the version fasta 3 (W. R. Pearson and D. J. Lipman (1988), Improved Tools for Biological Sequence Comparison.PNAS 85:2444- 2448; W. R. Pearson (1990) Rapid and Sensitive Sequence Comparison with FASTP and FASTA, Methods in Enzymology 183:63 - 98; W. R. Pearson and D. J. Lipman (1988) Improved Tools for Biological Sequence Comparison.PNAS 85:2444- 2448; W. R. Pearson (1990); Rapid and Sensitive Sequence Comparison with FASTP and FASTAMethods in Enzymology 183:63 - 98). Another useful program for the calculation of homologies of different sequences is the standard blast program, which is included in the Biomax pedant software (Biomax, Munich, Federal Republic of Germany). This leads unfortunately sometimes to suboptimal results since blast does not always include complete sequences of the subject and the query. Nevertheless as this program is very efficient it can be used for the comparison of a huge number of sequences. The following settings are typically used for such a comparisons of sequences:
- p Program Name [String]; -d Database [String]; default = nr; -i Query File [File In]; default = stdin; -e Expectation value (E) [Real]; default = 10.0; -m alignment view options: 0 = pairwise; 1 = query-anchored showing identities; 2 = query-anchored no identities; 3 = flat query-anchored, show identities; 4 = flat query-anchored, no identities; 5 = query-anchored no identities and blunt ends; 6 = flat query-anchored, no identities and blunt ends; 7 = XML Blast output; 8 = tabular; 9 tabular with comment lines [Integer]; default = 0; -o BLAST report Output File [File Out] Optional; default = stdout; -F Filter query sequence (DUST with blastn, SEG with others) [String]; default = T; -G Cost to open a gap (zero invokes default behavior) [Integer]; default = 0; -E Cost to extend a gap (zero invokes default behavior) [Integer]; default = 0; -X X dropoff value for gapped alignment (in bits) (zero invokes default behavior); blastn 30, megablast 20, tblastx 0, all others 15 [Integer]; default = 0; -l Show GI's in deflines [T/F]; default = F; -q Penalty for a nucleotide mismatch (blastn only) [Integer]; default = -3; -r Reward for a nucleotide match (blastn only) [Integer]; default = 1; -v Number of database sequences to show one-line descriptions for (V) [Integer]; default = 500; -b Number of database sequence to show alignments for (B) [Integer]; default = 250; -f Threshold for extending hits, default if zero; blastp 11, blastn 0, blastx 12, tblastn 13; tblastx 13, megablast 0 [Integer]; default = 0; -g Perform gapped alignment (not available with tblastx) [T/F]; default = T; -Q Query Genetic code to use [Integer]; default = 1; -D DB Genetic code (for tblast[nx] only) [Integer]; default = 1; -a Number of processors to use [Integer]; default = 1; -O SeqAlign file [File Out] Optional; -J

- Believe the query define [T/F]; default = F; -M Matrix [String]; default = BLOSUM62; -W Word size, default if zero (blastn 11, megablast 28, all others 3) [Integer]; default = 0; -z Effective length of the database (use zero for the real size) [Real]; default = 0; -K Number of best hits from a region to keep (off by default, if used a value of 100 is recommended) [Integer]; default = 0; -P 0 for multiple hit, 1 for single hit [Integer]; default = 0; -Y Effective length of the search space (use zero for the real size) [Real]; default = 0; -S Query strands to search against database (for blast[nx], and tblastx); 3 is both, 1 is top, 2 is bottom [Integer]; default = 3; -T Produce HTML output [T/F]; default = F; -I Restrict search of database to list of GI's [String] Optional; -U Use lower case filtering of FASTA sequence [T/F] Optional; default = F; -y X dropoff value for ungapped extensions in bits (0.0 invokes default behavior); blastn 20, megablast 10, all others 7 [Real]; default = 0.0; -Z X dropoff value for final gapped alignment in bits (0.0 invokes default behavior); blastn/megablast 50, tblastx 0, all others 25 [Integer]; default = 0; -R PSI-TBLASTN checkpoint file [File In] Optional; -n MegaBlast search [T/F]; default = F; -L Location on query sequence [String] Optional; -A Multiple Hits window size, default if zero (blastn/megablast 0, all others 40 [Integer]; default = 0; -w Frame shift penalty (OOF algorithm for blastx) [Integer]; default = 0; -t Length of the largest intron allowed in tblastn for linking HSPs (0 disables linking) [Integer]; default = 0.
- 20 **[0184.0.0.0]** Results of high quality are reached by using the algorithm of Needleman and Wunsch or Smith and Waterman. Therefore programs based on said algorithms are preferred. Advantageously the comparisons of sequences can be done with the program PileUp (J. Mol. Evolution., 25, 351-360, 1987, Higgins et al., CABIOS, 5 1989: 151-153) or preferably with the programs Gap and BestFit, which are respectively
- 25 based on the algorithms of Needleman and Wunsch [J. Mol. Biol. 48; 443-453 (1970)] and Smith and Waterman [Adv. Appl. Math. 2; 482-489 (1981)]. Both programs are part of the GCG software-package [Genetics Computer Group, 575 Science Drive, Madison, Wisconsin, USA 53711 (1991); Altschul et al. (1997) Nucleic Acids Res. 25:3389 et seq.]. Therefore preferably the calculations to determine the percentages of
- 30 sequence homology are done with the program Gap over the whole range of the sequences. The following standard adjustments for the comparison of nucleic acid sequences were used: gap weight: 50, length weight: 3, average match: 10.000, average mismatch: 0.000.
- 35 **[0185.0.0.0]** For example a sequence which has a 80% homology with sequence SEQ ID NO: 1 at the nucleic acid level is understood as meaning a sequence which, upon comparison with the sequence SEQ ID NO: 1 by the above Gap program algorithm with the above parameter set, has a 80% homology.
- 40 **[0186.0.0.0]** In the state of the art, homology between two polypeptides is also understood as meaning the identity of the amino acid sequence over in each case the entire sequence length which is calculated by comparison with the aid of the program

algorithm GAP (Wisconsin Package Version 10.0, University of Wisconsin, Genetics Computer Group (GCG), Madison, USA), setting the following parameters:

Gap weight: 8 Length weight: 2
Average match: 2,912 Average mismatch: -2,003

- 5 **[0187.0.0.0]** For example a sequence which has a 80% homology with sequence SEQ ID NO: 2 at the protein level is understood as meaning a sequence which, upon comparison with the sequence SEQ ID NO: 2 by the above program algorithm with the above parameter set, has a 80% homology.
- [0188.0.0.0]** Functional equivalents derived from one of the polypeptides as depicted
- 10 in SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198,
- 15 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368,
- 20 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394 according to the invention by substitution, insertion or deletion have at least 30%, 35%, 40%, 45% or 50%, preferably at least 55%, 60%, 65% or 70% by preference at least 80%, especially preferably at least 85% or 90%, 91%, 92%, 93% or 94%, very especially preferably at least 95%, 97%, 98% or 99% homology with one of the polypeptides as shown in SEQ
- 25 ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200,
- 30 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370,
- 35 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394 according to the invention and are distinguished by essentially the same properties as the polypeptide as shown in SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124,
- 40 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158,

160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192,
194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226,
228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260,
262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294,
5 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328,
330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362,
364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394.

[0189.0.0.0] Functional equivalents derived from the nucleic acid sequence as
depicted in SEQ ID NO: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35,
10 37, 39, 41, 43, 45, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83, 85, 87, 89,
91, 93, 95, 97, 99, 101, 103, 105, 107, 109, 111, 113, 115, 117, 119, 121, 123, 125,
127, 129, 131, 133, 135, 137, 139, 141, 143, 145, 147, 149, 151, 153, 155, 157, 159,
161, 163, 165, 167, 169, 171, 173, 175, 177, 179, 181, 183, 185, 187, 189, 191, 193,
195, 197, 199, 201, 203, 205, 207, 209, 211, 213, 215, 217, 219, 221, 223, 225, 227,
15 229, 231, 233, 235, 237, 239, 241, 243, 245, 247, 249, 251, 253, 255, 257, 259, 261,
263, 265, 267, 269, 271, 273, 275, 277, 279, 281, 283, 285, 287, 289, 291, 293, 295,
297, 299, 301, 303, 305, 307, 309, 311, 313, 315, 317, 319, 321, 323, 325, 327, 329,
331, 333, 335, 337, 339, 341, 343, 345, 347, 349, 351, 353, 355, 357, 359, 361, 363,
365, 367, 369, 371, 373, 375, 377, 379, 381, 383, 385, 387, 389, 391 or 393 according
20 to the invention by substitution, insertion or deletion have at least 30%, 35%, 40%, 45%,
or 50%, preferably at least 55%, 60%, 65% or 70% by preference at least 80%,
especially preferably at least 85% or 90%, 91%, 92%, 93% or 94%, very especially
preferably at least 95%, 97%, 98% or 99% homology with one of the polypeptides as
shown in SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36,
25 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90,
92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126,
128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160,
162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194,
196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228,
30 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262,
264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296,
298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330,
332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364,
366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394 according
35 to the invention and encode polypeptides having essentially the same properties as the
polypeptide as shown in SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28,
30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82,
84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120,
122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154,
40 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188,
190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222,

224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394.

[0190.0.0.0] "Essentially the same properties" of a functional equivalent is above all understood as meaning that the functional equivalent has above mentioned activity, e.g. conferring an increase in the fine chemical amount while increasing the amount of protein, activity or function of said functional equivalent in an organism, e.g. a microorganism, a plant or plant or animal tissue, plant or animal cells or a part of the same.

[0191.0.0.0] A nucleic acid molecule encoding an homologous to a protein sequence of SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394 can be created by introducing one or more nucleotide substitutions, additions or deletions into a nucleotide sequence of the nucleic acid molecule of the present invention, in particular of SEQ ID NO: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, 43, 45, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83, 85, 87, 89, 91, 93, 95, 97, 99, 101, 103, 105, 107, 109, 111, 113, 115, 117, 119, 121, 123, 125, 127, 129, 131, 133, 135, 137, 139, 141, 143, 145, 147, 149, 151, 153, 155, 157, 159, 161, 163, 165, 167, 169, 171, 173, 175, 177, 179, 181, 183, 185, 187, 189, 191, 193, 195, 197, 199, 201, 203, 205, 207, 209, 211, 213, 215, 217, 219, 221, 223, 225, 227, 229, 231, 233, 235, 237, 239, 241, 243, 245, 247, 249, 251, 253, 255, 257, 259, 261, 263, 265, 267, 269, 271, 273, 275, 277, 279, 281, 283, 285, 287, 289, 291, 293, 295, 297, 299, 301, 303, 305, 307, 309, 311, 313, 315, 317, 319, 321, 323, 325, 327, 329, 331, 333, 335, 337, 339, 341, 343, 345, 347, 349, 351, 353, 355, 357, 359, 361, 363, 365, 367, 369, 371, 373, 375, 377, 379, 381, 383, 385, 387, 389, 391 or 393 such that one or more amino acid substitutions, additions or deletions are introduced into the encoded protein. Mutations can be introduced into the encoding sequences of SEQ ID NO: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, 43, 45, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83, 85, 87, 89, 91, 93, 95, 97, 99, 101, 103, 105, 107,

109, 111, 113, 115, 117, 119, 121, 123, 125, 127, 129, 131, 133, 135, 137, 139, 141,
143, 145, 147, 149, 151, 153, 155, 157, 159, 161, 163, 165, 167, 169, 171, 173, 175,
177, 179, 181, 183, 185, 187, 189, 191, 193, 195, 197, 199, 201, 203, 205, 207, 209,
211, 213, 215, 217, 219, 221, 223, 225, 227, 229, 231, 233, 235, 237, 239, 241, 243,
5 245, 247, 249, 251, 253, 255, 257, 259, 261, 263, 265, 267, 269, 271, 273, 275, 277,
279, 281, 283, 285, 287, 289, 291, 293, 295, 297, 299, 301, 303, 305, 307, 309, 311,
313, 315, 317, 319, 321, 323, 325, 327, 329, 331, 333, 335, 337, 339, 341, 343, 345,
347, 349, 351, 353, 355, 357, 359, 361, 363, 365, 367, 369, 371, 373, 375, 377, 379,
381, 383, 385, 387, 389, 391 or 393 by standard techniques, such as site-directed
10 mutagenesis and PCR-mediated mutagenesis.

[0192.0.0.0] Preferably, conservative amino acid substitutions are made at one or
more predicted non-essential amino acid residues. A "conservative amino acid
substitution" is one in which the amino acid residue is replaced with an amino acid
residue having a similar side chain. Families of amino acid residues having similar side
15 chains have been defined in the art. These families include amino acids with basic side
chains (e.g., lysine, arginine, histidine), acidic side chains (e.g., aspartic acid, glutamic
acid), uncharged polar side chains (e.g., glycine, asparagine, glutamine, serine,
threonine, tyrosine, cysteine), nonpolar side chains (e.g., alanine, valine, leucine,
isoleucine, proline, phenylalanine, methionine, tryptophan), beta-branched side chains
20 (e.g., threonine, valine, isoleucine) and aromatic side chains (e.g., tyrosine,
phenylalanine, tryptophan, histidine).

[0193.0.0.0] Thus, a predicted nonessential amino acid residue in a polypeptide of
the invention or a polypeptide used in the process of the invention is preferably
replaced with another amino acid residue from the same family. Alternatively, in
25 another embodiment, mutations can be introduced randomly along all or part of a
coding sequence of a nucleic acid molecule of the invention or used in the process of
the invention, such as by saturation mutagenesis, and the resultant mutants can be
screened for activity described herein to identify mutants that retain or even have
increased above mentioned activity, e.g. conferring an increase in content of the fine
30 chemical.

[0194.0.0.0] Following mutagenesis of one of the sequences of shown herein, the
encoded protein can be expressed recombinantly and the activity of the protein can be
determined using, for example, assays described herein (see Examples).

[0195.0.0.0] The highest homology of the nucleic acid molecule used in the process
35 according to the invention was found for the following database entries by Gap search.

[0196.0.0.0] Homologues of the nucleic acid sequences used, with the sequence as
depicted in SEQ ID NO: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35,
37, 39, 41 43, 45, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83, 85, 87, 89,

91, 93, 95, 97, 99, 101, 103, 105, 107, 109, 111, 113, 115, 117, 119, 121, 123, 125, 127, 129, 131, 133, 135, 137, 139, 141, 143, 145, 147, 149, 151, 153, 155, 157, 159, 161, 163, 165, 167, 169, 171, 173, 175, 177, 179, 181, 183, 185, 187, 189, 191, 193, 195, 197, 199, 201, 203, 205, 207, 209, 211, 213, 215, 217, 219, 221, 223, 225, 227, 229, 231, 233, 235, 237, 239, 241, 243, 245, 247, 249, 251, 253, 255, 257, 259, 261, 263, 265, 267, 269, 271, 273, 275, 277, 279, 281, 283, 285, 287, 289, 291, 293, 295, 297, 299, 301, 303, 305, 307, 309, 311, 313, 315, 317, 319, 321, 323, 325, 327, 329, 331, 333, 335, 337, 339, 341, 343, 345, 347, 349, 351, 353, 355, 357, 359, 361, 363, 365, 367, 369, 371, 373, 375, 377, 379, 381, 383, 385, 387, 389, 391 or 393, comprise also allelic variants with at least approximately 30%, 35%, 40% or 45% homology, by preference at least approximately 50%, 60% or 70%, more preferably at least approximately 90%, 91%, 92%, 93%, 94% or 95% and even more preferably at least approximately 96%, 97%, 98%, 99% or more homology with one of the nucleotide sequences shown or the abovementioned derived nucleic acid sequences or their homologues, derivatives or analogues or parts of these. Allelic variants encompass in particular functional variants which can be obtained by deletion, insertion or substitution of nucleotides from the sequences shown, preferably from SEQ ID NO: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, 43, 45, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83, 85, 87, 89, 91, 93, 95, 97, 99, 101, 103, 105, 107, 109, 111, 113, 115, 117, 119, 121, 123, 125, 127, 129, 131, 133, 135, 137, 139, 141, 143, 145, 147, 149, 151, 153, 155, 157, 159, 161, 163, 165, 167, 169, 171, 173, 175, 177, 179, 181, 183, 185, 187, 189, 191, 193, 195, 197, 199, 201, 203, 205, 207, 209, 211, 213, 215, 217, 219, 221, 223, 225, 227, 229, 231, 233, 235, 237, 239, 241, 243, 245, 247, 249, 251, 253, 255, 257, 259, 261, 263, 265, 267, 269, 271, 273, 275, 277, 279, 281, 283, 285, 287, 289, 291, 293, 295, 297, 299, 301, 303, 305, 307, 309, 311, 313, 315, 317, 319, 321, 323, 325, 327, 329, 331, 333, 335, 337, 339, 341, 343, 345, 347, 349, 351, 353, 355, 357, 359, 361, 363, 365, 367, 369, 371, 373, 375, 377, 379, 381, 383, 385, 387, 389, 391 or 393, or from the derived nucleic acid sequences, the intention being, however, that the enzyme activity or the biological activity of the resulting proteins synthesized is advantageously retained or increased.

[0197.0.0.0] In one embodiment of the present invention, the nucleic acid molecule of the invention or used in the process of the invention comprises the sequences shown in any of the sequences SEQ ID NO: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, 43, 45, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83, 85, 87, 89, 91, 93, 95, 97, 99, 101, 103, 105, 107, 109, 111, 113, 115, 117, 119, 121, 123, 125, 127, 129, 131, 133, 135, 137, 139, 141, 143, 145, 147, 149, 151, 153, 155, 157, 159, 161, 163, 165, 167, 169, 171, 173, 175, 177, 179, 181, 183, 185, 187, 189, 191, 193, 195, 197, 199, 201, 203, 205, 207, 209, 211, 213, 215, 217, 219, 221, 223, 225, 227, 229, 231, 233, 235, 237, 239, 241, 243, 245, 247, 249, 251, 253, 255, 257, 259, 261, 263, 265, 267, 269, 271, 273, 275, 277, 279, 281, 283, 285, 287, 289, 291, 293, 295, 297, 299, 301, 303, 305, 307, 309, 311, 313, 315, 317, 319, 321, 323, 325,

327, 329, 331, 333, 335, 337, 339, 341, 343, 345, 347, 349, 351, 353, 355, 357, 359, 361, 363, 365, 367, 369, 371, 373, 375, 377, 379, 381, 383, 385, 387, 389, 391 or 393.

It is preferred that the nucleic acid molecule comprises as little as possible other

nucleotides not shown in any one of SEQ ID NO: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21,
 5 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, 43, 45, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75,
 77, 79, 81, 83, 85, 87, 89, 91, 93, 95, 97, 99, 101, 103, 105, 107, 109, 111, 113, 115,
 117, 119, 121, 123, 125, 127, 129, 131, 133, 135, 137, 139, 141, 143, 145, 147, 149,
 151, 153, 155, 157, 159, 161, 163, 165, 167, 169, 171, 173, 175, 177, 179, 181, 183,
 185, 187, 189, 191, 193, 195, 197, 199, 201, 203, 205, 207, 209, 211, 213, 215, 217,
 10 219, 221, 223, 225, 227, 229, 231, 233, 235, 237, 239, 241, 243, 245, 247, 249, 251,
 253, 255, 257, 259, 261, 263, 265, 267, 269, 271, 273, 275, 277, 279, 281, 283, 285,
 287, 289, 291, 293, 295, 297, 299, 301, 303, 305, 307, 309, 311, 313, 315, 317, 319,
 321, 323, 325, 327, 329, 331, 333, 335, 337, 339, 341, 343, 345, 347, 349, 351, 353,
 355, 357, 359, 361, 363, 365, 367, 369, 371, 373, 375, 377, 379, 381, 383, 385, 387,
 15 389, 391 or 393. In one embodiment, the nucleic acid molecule comprises less than
 500, 400, 300, 200, 100, 90, 80, 70, 60, 50 or 40 further nucleotides. In a further
 embodiment, the nucleic acid molecule comprises less than 30, 20 or 10 further
 nucleotides. In one embodiment, the nucleic acid molecule use in the process of the
 invention is identical to the sequences shown in SEQ ID NO: 1, 3, 5, 7, 9, 11, 13, 15,
 20 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, 43, 45, 55, 57, 59, 61, 63, 65, 67, 69,
 71, 73, 75, 77, 79, 81, 83, 85, 87, 89, 91, 93, 95, 97, 99, 101, 103, 105, 107, 109, 111,
 113, 115, 117, 119, 121, 123, 125, 127, 129, 131, 133, 135, 137, 139, 141, 143, 145,
 147, 149, 151, 153, 155, 157, 159, 161, 163, 165, 167, 169, 171, 173, 175, 177, 179,
 181, 183, 185, 187, 189, 191, 193, 195, 197, 199, 201, 203, 205, 207, 209, 211, 213,
 25 215, 217, 219, 221, 223, 225, 227, 229, 231, 233, 235, 237, 239, 241, 243, 245, 247,
 249, 251, 253, 255, 257, 259, 261, 263, 265, 267, 269, 271, 273, 275, 277, 279, 281,
 283, 285, 287, 289, 291, 293, 295, 297, 299, 301, 303, 305, 307, 309, 311, 313, 315,
 317, 319, 321, 323, 325, 327, 329, 331, 333, 335, 337, 339, 341, 343, 345, 347, 349,
 351, 353, 355, 357, 359, 361, 363, 365, 367, 369, 371, 373, 375, 377, 379, 381, 383,
 30 385, 387, 389, 391 or 393.

[0198.0.0.0] Also preferred is that the nucleic acid molecule used in the process of
 the invention encodes a polypeptide comprising the sequence as depicted in SEQ ID
 NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46,
 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100,
 35 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134,
 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168,
 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202,
 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236,
 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270,
 40 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304,
 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338,

340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394. In one embodiment, the nucleic acid molecule encodes less than 150, 130, 100, 80, 60, 50, 40 or 30 further amino acids. In a further embodiment, the encoded polypeptide comprises less than

5 20, 15, 10, 9, 8, 7, 6 or 5 further amino acids. In one embodiment used in the inventive process, the encoded polypeptide is identical to the sequences as depicted in SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134,

10 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304,

15 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394.

[0199.0.0.0] In one embodiment, the nucleic acid molecule of the invention or used in the process encodes a polypeptide comprising the sequence as depicted in SEQ ID

20 NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202,

25 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372,

30 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394 and comprises less than 100 further nucleotides. In a further embodiment, said nucleic acid molecule comprises less than 30 further nucleotides. In one embodiment, the nucleic acid molecule used in the process is identical to a coding sequence of the sequences as depicted in SEQ ID NO:

35 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, 43, 45, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83, 85, 87, 89, 91, 93, 95, 97, 99, 101, 103, 105, 107, 109, 111, 113, 115, 117, 119, 121, 123, 125, 127, 129, 131, 133, 135, 137, 139, 141, 143, 145, 147, 149, 151, 153, 155, 157, 159, 161, 163, 165, 167, 169, 171, 173, 175, 177, 179, 181, 183, 185, 187, 189, 191, 193, 195, 197, 199, 201, 203, 205, 207, 209, 211, 213, 215, 217, 219, 221, 223, 225, 227, 229, 231, 233, 235, 237,

40 239, 241, 243, 245, 247, 249, 251, 253, 255, 257, 259, 261, 263, 265, 267, 269, 271, 273, 275, 277, 279, 281, 283, 285, 287, 289, 291, 293, 295, 297, 299, 301, 303, 305,

307, 309, 311, 313, 315, 317, 319, 321, 323, 325, 327, 329, 331, 333, 335, 337, 339, 341, 343, 345, 347, 349, 351, 353, 355, 357, 359, 361, 363, 365, 367, 369, 371, 373, 375, 377, 379, 381, 383, 385, 387, 389, 391 or 393.

[0200.0.0.0] Polypeptides (= proteins), which still have the essential enzymatic activity of the polypeptide of the present invention conferring an increase of the fine chemical i.e. whose activity is essentially not reduced, are polypeptides with at least 10% or 20%, by preference 30% or 40%, especially preferably 50% or 60%, very especially preferably 80% or 90 or more of the wild type biological activity or enzyme activity, advantageously, the activity is essentially not reduced in comparison with the activity of a polypeptide as depicted in SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394 expressed under identical conditions.

[0201.0.0.0] Homologues of as depicted in SEQ ID NO: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, 43, 45, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83, 85, 87, 89, 91, 93, 95, 97, 99, 101, 103, 105, 107, 109, 111, 113, 115, 117, 119, 121, 123, 125, 127, 129, 131, 133, 135, 137, 139, 141, 143, 145, 147, 149, 151, 153, 155, 157, 159, 161, 163, 165, 167, 169, 171, 173, 175, 177, 179, 181, 183, 185, 187, 189, 191, 193, 195, 197, 199, 201, 203, 205, 207, 209, 211, 213, 215, 217, 219, 221, 223, 225, 227, 229, 231, 233, 235, 237, 239, 241, 243, 245, 247, 249, 251, 253, 255, 257, 259, 261, 263, 265, 267, 269, 271, 273, 275, 277, 279, 281, 283, 285, 287, 289, 291, 293, 295, 297, 299, 301, 303, 305, 307, 309, 311, 313, 315, 317, 319, 321, 323, 325, 327, 329, 331, 333, 335, 337, 339, 341, 343, 345, 347, 349, 351, 353, 355, 357, 359, 361, 363, 365, 367, 369, 371, 373, 375, 377, 379, 381, 383, 385, 387, 389, 391 or 393 also mean truncated sequences, cDNA, single-stranded DNA or RNA of the coding and noncoding DNA sequence. Homologues of said sequences are also understood as meaning derivatives, which comprise noncoding regions such as, for example, UTRs, terminators, enhancers or promoter variants. The promoters upstream of the nucleotide sequences stated can be modified by one or more nucleotide substitution(s), insertion(s) and/or deletion(s) without, however, interfering with the functionality or activity either of the promoters, the open reading frame (= ORF) or with the 3'-regulatory region such as terminators or other 3'-regulatory regions, which are far away from the ORF. It is furthermore possible that the activity of

the promoters is increased by modification of their sequence, or that they are replaced completely by more active promoters, even promoters from heterologous organisms. Appropriate promoters are known to the person skilled in the art and are mentioned herein below.

- 5 **[0202.0.0.0]** In a further embodiment, the process according to the present invention comprises the following steps:
- (a) selecting an organism or a part thereof expressing the polypeptide of this invention;
 - (b) mutagenizing the selected organism or the part thereof;
 - 10 (c) comparing the activity or the expression level of said polypeptide in the mutagenized organism or the part thereof with the activity or the expression of said polypeptide in the selected organisms or the part thereof;
 - (d) selecting the mutagenized organisms or parts thereof, which comprise an increased activity or expression level of said polypeptide compared to the
15 selected organism (a) or the part thereof;
 - (e) optionally, growing and cultivating the organisms or the parts thereof; and
 - (f) recovering, and optionally isolating, the free or bound the fine chemical produced by the selected mutated organisms or parts thereof.

- 20 **[0203.0.0.0]** The organisms or part thereof produce according to the herein mentioned process of the invention an increased level of free and/or protein-bound fine chemical compared to said control or selected organisms or parts thereof.

- 25 **[0204.0.0.0]** Advantageously the selected organisms are mutagenized according to the invention. According to the invention mutagenesis is any change of the genetic information in the genom of an organism, that means any structural or compositional change in the nucleic acid preferably DNA of an organism that is not caused by normal segregation or genetic recombination processes. Such mutations may occur spontaneously, or may be induced by mutagens as described below. Such change can be induced either randomly or selectively. In both cases the genetic information of the organism is modified. In general this lead to the situation that the activity of the gene
30 product of the relevant genes inside the cells or inside the organism is increased.

[0205.0.0.0] In case of the specific or so called site directed mutagenesis a distinct gene is mutated and thereby its activity and/or the activity or the encoded gene product is repressed, reduced or increased, preferably increased. In the event of a random

mutagenesis one or more genes are mutated by chance and their activities and/or the activities of their gene products are repressed, reduced or increased, preferably increased.

5 **[0206.0.0.0]** For the purpose of a mutagenesis of a huge population of organisms, such population can be transformed with a DNA construct, which is useful for the activation of as much as possible genes of an organism, preferably all genes. For example the construct can contain a strong promoter or one or more enhancers, which are capable of transcriptionally activate genes in the vicinity of their integration side. With this method it is possible to statistically mutagenize, eg activate nearly all genes of
10 an organism by the random integration of an activation construct. Afterwards the skilled worker can identify those mutagenized lines in which a gene of the invention has been activated, which in turns leads to the desired increase in the fine chemical production.

[0207.0.0.0] The genes of the invention can also be activated by mutagenesis, either of regulatory or coding regions. In the event of a random mutagenesis a huge number
15 of organisms are treated with a mutagenic agent. The amount of said agent and the intensity of the treatment will be chosen in such a manner that statistically nearly every gene is mutated once. The process for the random mutagenesis as well as the respective agents is well known by the skilled person. Such methods are disclosed for example by A.M. van Harten [(1998), "Mutation breeding: theory and practical
20 applications", Cambridge University Press, Cambridge, UK], E Friedberg, G Walker, W Siede [(1995), "DNA Repair and Mutagenesis", Blackwell Publishing], or K. Sankaranarayanan, J. M. Gentile, L. R. Ferguson [(2000) "Protocols in Mutagenesis", Elsevier Health Sciences]. As the skilled worker knows the spontaneous mutation rate in the cells of an organism is very low and that a large number of chemical, physical or
25 biological agents are available for the mutagenesis of organisms. These agents are named as mutagens or mutagenic agents. As mentioned before three different kinds of mutagens (chemical, physical or biological agents) are available.

[0208.0.0.0] There are different classes of chemical mutagens, which can be separated by their mode of action. For example base analogues such as 5-
30 bromouracil, 2-amino purin. Other chemical mutagens are interacting with the DNA such as sulphuric acid, nitrous acid, hydroxylamine; or other alkylating agents such as monofunctional agents like ethyl methanesulfonate, dimethylsulfate, methyl methanesulfonate), bifunctional like dichloroethyl sulphide, Mitomycin, Nitrosoguanidine – dialkyl nitrosamine, N-Nitrosoguanidine derivatives, N-alkyl-N-nitro-N-nitroso-guanidine-), intercalating dyes like Acridine, ethidium bromide).
35

[0209.0.0.0] Physical mutagens are for example ionizing irradiation (X ray), UV irradiation. Different forms of irradiation are available and they are strong mutagens. Two main classes of irradiation can be distinguished: a) non-ionizing irradiation such as UV light or ionizing irradiation such as X ray. Biological mutagens are for example

transposable elements for example IS elements such as IS100, transposons such as Tn5, Tn10, Tn916 or Tn1000 or phages like Mu^{amplac}, P1, T5, λ plac etc. Methods for introducing this phage DNA into the appropriate microorganism are well known to the skilled worker (see Microbiology, Third Edition, Eds. Davis, B.D., Dulbecco, R., Eisen, H.N. and Ginsberg, H.S., Harper International Edition, 1980). The common procedure of a transposon mutagenesis is the insertion of a transposable element within a gene or nearby for example in the promotor or terminator region and thereby leading to a loss of the gene function. Procedures to localize the transposon within the genome of the organisms are well known by a person skilled in the art.

10 [0210.0.0.0] Preferably a chemical or biochemical procedure is used for the mutagenesis of the organisms. A preferred chemical method is the mutagenesis with N-methyl-N-nitro-nitrosoguanidine.

15 [0211.0.0.0] Other biological methods are disclosed by Spee et al. (Nucleic Acids Research, Vol. 21, No. 3, 1993: 777 - 778). Spee et al. teaches a PCR method using dITP for the random mutagenesis. This method described by Spee et al. was further improved by Rellos et al. (Protein Expr. Purif., 5, 1994 : 270 - 277). The use of an in vitro recombination technique for molecular mutagenesis is described by Stemmer (Proc. Natl. Acad. Sci. USA, Vol. 91, 1994: 10747 - 10751). Moore et al. (Nature Biotechnology Vol. 14, 1996: 458 - 467) describe the combination of the PCR and recombination methods for increasing the enzymatic activity of an esterase toward a para-nitrobenzyl ester. Another route to the mutagenesis of enzymes is described by Greener et al. in Methods in Molecular Biology (Vol. 57, 1996: 375 - 385). Greener et al. use the specific Escherichia coli strain XL1-Red to generate Escherichia coli mutants, which have increased antibiotic resistance.

25 [0212.0.0.0] In one embodiment, the protein according to the invention or the nucleic acid molecule characterized herein originates from a eukaryotic or prokaryotic organism such as a non-human animal, a plant, a microorganism such as a fungus, yeast, an alga, a diatom or a bacterium. Nucleic acid molecules, which advantageously can be used in the process of the invention originate from yeasts, for example the family Saccharomycetaceae, in particular the genus Saccharomyces, or yeast genera such as Candida, Hansenula, Pichia, Yarrowia, Rhodotorula or Schizosaccharomyces and the especially advantageous from the species Saccharomyces cerevisiae.

35 [0213.0.0.0] In one embodiment, nucleic acid molecules, which advantageously can be used in the process of the invention originate from yeast, for example from Saccharomycetaceae, particularly from the genus Saccharomyces advantageously form the species Saccharomyces cerevisiae.

[0214.0.0.0] If, in the process according to the invention, plants are selected as the donor organism, this plant may, in principle, be in any phylogenetic relation of the

recipient plant. Donor and recipient plant may belong to the same family, genus, species, variety or line, resulting in an increasing homology between the nucleic acids to be integrated and corresponding parts of the genome of the recipient plant. This also applies analogously to microorganisms as donor and recipient organism.

- 5 It might also be advantageously to use nucleic acids molecules from very distinct species, since these might exhibit reduced sensitivity against endogenous regulatory mechanisms and such sequences might not be recognized by endogenous silencing mechanisms.

10 **[0215.0.0.0]** Accordingly, one embodiment of the application relates to the use of nucleic acid molecules in the process of the invention from plants, e.g. crop plants, e.g. from: *B. napus*; *O. sativa*, *Glycine max*; *B. vulgaris*, *L. japonicus*, *Z. elegans*, *Z. mays*, *C. arifolium*, *A. thaliana*, *H. vulgare*, *N. tabacum*, *G. hirsutum*, *P. patens*, *F. distichus*, sunflower linseed or maize or their homologues.

15 **[0216.0.0.0]** Accordingly, in one embodiment, the invention relates to a nucleic acid molecule, which comprises a nucleic acid molecule selected from the group consisting of:

- 20 a) nucleic acid molecule encoding of the polypeptide as depicted in SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394 or a fragment thereof, which confers an increase in the amount of fine chemical in an organism or a part thereof;
- 30 b) nucleic acid molecule comprising of the nucleic acid molecule as depicted in SEQ ID NO: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, 43, 45, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83, 85, 87, 89, 91, 93, 95, 97, 99, 101, 103, 105, 107, 109, 111, 113, 115, 117, 119, 121, 123, 125, 127, 129, 131, 133, 135, 137, 139, 141, 143, 145, 147, 149, 151, 153, 155, 157, 159, 161, 163, 165, 167, 169, 171, 173, 175, 177, 179, 181, 183, 185, 187, 189, 191, 193, 195, 197, 199, 201, 203, 205, 207, 209, 211, 213, 215, 217, 219, 221, 223, 225, 227, 229, 231, 233, 235, 237, 239, 241, 243, 245, 247, 249, 251, 253, 255, 257, 259, 261, 263, 265, 267, 269, 271, 273, 275, 277, 279, 281, 283, 285,
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- 287, 289, 291, 293, 295, 297, 299, 301, 303, 305, 307, 309, 311, 313, 315, 317, 319, 321, 323, 325, 327, 329, 331, 333, 335, 337, 339, 341, 343, 345, 347, 349, 351, 353, 355, 357, 359, 361, 363, 365, 367, 369, 371, 373, 375, 377, 379, 381, 383, 385, 387, 389, 391 or 393 or a fragment thereof, which confers an increase
5 in the amount of fine chemical in an organism or a part thereof;
- c) nucleic acid molecule whose sequence can be deduced from a polypeptide sequence encoded by a nucleic acid molecule of (a) or (b) as a result of the degeneracy of the genetic code and conferring an increase in the amount of fine chemical in an organism or a part thereof;
- 10 d) nucleic acid molecule which encodes a polypeptide which has at least 50% identity with the amino acid sequence of the polypeptide encoded by the nucleic acid molecule of (a) to (c) and conferring an increase in the amount of fine chemical in an organism or a part thereof;
- 15 e) nucleic acid molecule which hybridizes with a nucleic acid molecule of (a) to (c) under stringent hybridization conditions and conferring an increase in the amount of fine chemical in an organism or a part thereof;
- f) nucleic acid molecule encoding a polypeptide, the polypeptide being derived by substituting, deleting and/or adding one or more amino acids of the amino acid sequence of the polypeptide encoded by the nucleic acid molecules (a) to (d), preferably to (a) to (c), and conferring an increase in the amount of the fine
20 chemical in an organism or a part thereof;
- g) nucleic acid molecule encoding a fragment or an epitope of a polypeptide which is encoded by one of the nucleic acid molecules of (a) to (e), preferably to (a) to (c) and conferring an increase in the amount of the fine chemical in an organism
25 or a part thereof ;
- h) nucleic acid molecule which encompasses a nucleic acid molecule which is obtained by amplifying nucleic acid molecules from a cDNA library or a genomic library using the primers in SEQ ID NO: 53, SEQ ID NO: 54, SEQ ID NO: 395 or SEQ ID NO: 396 and conferring an increase in the amount of the fine chemical in
30 an organism or a part thereof;
- i) nucleic acid molecule encoding a polypeptide which is isolated, e.g. from a expression library, with the aid of monoclonal and/or polyclonal antibodies against a polypeptide encoded by one of the nucleic acid molecules of (a) to (g), preferably to (a) to (c) and conferring an increase in the amount of the fine
35 chemical in an organism or a part thereof;

- j) nucleic acid molecule encoding a polypeptide comprising the consensus sequence as depicted in SEQ ID NO: 47, SEQ ID NO: 48, SEQ ID NO: 49, SEQ ID NO: 50, SEQ ID NO: 51, SEQ ID NO: 52, SEQ ID NO: 397, SEQ ID NO: 398, SEQ ID NO: 399 and/or SEQ ID NO: 400 and conferring an increase in the amount of the fine chemical in an organism or a part thereof; and/or
- k) nucleic acid molecule which is obtainable by screening a suitable nucleic acid library under stringent hybridization conditions with a probe comprising one of the sequences of the nucleic acid molecule of (a) to (k) or with a fragment of at least 15 nt, preferably 20 nt, 30 nt, 50 nt, 100 nt, 200 nt or 500 nt of the nucleic acid molecule characterized in (a) to (h) or of the nucleic acid molecule as depicted in SEQ ID NO: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, 43, 45, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83, 85, 87, 89, 91, 93, 95, 97, 99, 101, 103, 105, 107, 109, 111, 113, 115, 117, 119, 121, 123, 125, 127, 129, 131, 133, 135, 137, 139, 141, 143, 145, 147, 149, 151, 153, 155, 157, 159, 161, 163, 165, 167, 169, 171, 173, 175, 177, 179, 181, 183, 185, 187, 189, 191, 193, 195, 197, 199, 201, 203, 205, 207, 209, 211, 213, 215, 217, 219, 221, 223, 225, 227, 229, 231, 233, 235, 237, 239, 241, 243, 245, 247, 249, 251, 253, 255, 257, 259, 261, 263, 265, 267, 269, 271, 273, 275, 277, 279, 281, 283, 285, 287, 289, 291, 293, 295, 297, 299, 301, 303, 305, 307, 309, 311, 313, 315, 317, 319, 321, 323, 325, 327, 329, 331, 333, 335, 337, 339, 341, 343, 345, 347, 349, 351, 353, 355, 357, 359, 361, 363, 365, 367, 369, 371, 373, 375, 377, 379, 381, 383, 385, 387, 389, 391 or 393 or a nucleic acid molecule encoding, preferably at least the mature form of, the polypeptide as depicted in SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394, and conferring an increase in the amount of the fine chemical in an organism or a part thereof;

or which encompasses a sequence which is complementary thereto;

whereby, preferably, the nucleic acid molecule according to (a) to (k) distinguishes over the sequence as depicted in SEQ ID NO: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, 43, 45, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77, 79,

81, 83, 85, 87, 89, 91, 93, 95, 97, 99, 101, 103, 105, 107, 109, 111, 113, 115, 117, 119, 121, 123, 125, 127, 129, 131, 133, 135, 137, 139, 141, 143, 145, 147, 149, 151, 153, 155, 157, 159, 161, 163, 165, 167, 169, 171, 173, 175, 177, 179, 181, 183, 185, 187, 189, 191, 193, 195, 197, 199, 201, 203, 205, 207, 209, 211, 213, 215, 217, 219, 221, 223, 225, 227, 229, 231, 233, 235, 237, 239, 241, 243, 245, 247, 249, 251, 253, 255, 257, 259, 261, 263, 265, 267, 269, 271, 273, 275, 277, 279, 281, 283, 285, 287, 289, 291, 293, 295, 297, 299, 301, 303, 305, 307, 309, 311, 313, 315, 317, 319, 321, 323, 325, 327, 329, 331, 333, 335, 337, 339, 341, 343, 345, 347, 349, 351, 353, 355, 357, 359, 361, 363, 365, 367, 369, 371, 373, 375, 377, 379, 381, 383, 385, 387, 389, 391 or 393 by one or more nucleotides. In one embodiment, the nucleic acid molecule of the invention does not consist of the sequence as depicted in SEQ ID NO: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, 43, 45, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83, 85, 87, 89, 91, 93, 95, 97, 99, 101, 103, 105, 107, 109, 111, 113, 115, 117, 119, 121, 123, 125, 127, 129, 131, 133, 135, 137, 139, 141, 143, 145, 147, 149, 151, 153, 155, 157, 159, 161, 163, 165, 167, 169, 171, 173, 175, 177, 179, 181, 183, 185, 187, 189, 191, 193, 195, 197, 199, 201, 203, 205, 207, 209, 211, 213, 215, 217, 219, 221, 223, 225, 227, 229, 231, 233, 235, 237, 239, 241, 243, 245, 247, 249, 251, 253, 255, 257, 259, 261, 263, 265, 267, 269, 271, 273, 275, 277, 279, 281, 283, 285, 287, 289, 291, 293, 295, 297, 299, 301, 303, 305, 307, 309, 311, 313, 315, 317, 319, 321, 323, 325, 327, 329, 331, 333, 335, 337, 339, 341, 343, 345, 347, 349, 351, 353, 355, 357, 359, 361, 363, 365, 367, 369, 371, 373, 375, 377, 379, 381, 383, 385, 387, 389, 391 or 393. In an other embodiment, the nucleic acid molecule of the present invention is at least 30 % identical and less than 100%, 99,999%, 99,99%, 99,9% or 99% identical to the sequence as depicted in SEQ ID NO: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, 43, 45, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83, 85, 87, 89, 91, 93, 95, 97, 99, 101, 103, 105, 107, 109, 111, 113, 115, 117, 119, 121, 123, 125, 127, 129, 131, 133, 135, 137, 139, 141, 143, 145, 147, 149, 151, 153, 155, 157, 159, 161, 163, 165, 167, 169, 171, 173, 175, 177, 179, 181, 183, 185, 187, 189, 191, 193, 195, 197, 199, 201, 203, 205, 207, 209, 211, 213, 215, 217, 219, 221, 223, 225, 227, 229, 231, 233, 235, 237, 239, 241, 243, 245, 247, 249, 251, 253, 255, 257, 259, 261, 263, 265, 267, 269, 271, 273, 275, 277, 279, 281, 283, 285, 287, 289, 291, 293, 295, 297, 299, 301, 303, 305, 307, 309, 311, 313, 315, 317, 319, 321, 323, 325, 327, 329, 331, 333, 335, 337, 339, 341, 343, 345, 347, 349, 351, 353, 355, 357, 359, 361, 363, 365, 367, 369, 371, 373, 375, 377, 379, 381, 383, 385, 387, 389, 391 or 393. In a further embodiment the nucleic acid molecule does not encode the polypeptide sequence as depicted in SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240,

242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394. Accordingly, in one embodiment, the nucleic acid molecule of the present invention encodes in one embodiment a polypeptide which differs at least in one or more amino acids from the polypeptide as depicted in SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394. In another embodiment, the nucleic acid molecule as depicted in SEQ ID NO: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, 43, 45, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83, 85, 87, 89, 91, 93, 95, 97, 99, 101, 103, 105, 107, 109, 111, 113, 115, 117, 119, 121, 123, 125, 127, 129, 131, 133, 135, 137, 139, 141, 143, 145, 147, 149, 151, 153, 155, 157, 159, 161, 163, 165, 167, 169, 171, 173, 175, 177, 179, 181, 183, 185, 187, 189, 191, 193, 195, 197, 199, 201, 203, 205, 207, 209, 211, 213, 215, 217, 219, 221, 223, 225, 227, 229, 231, 233, 235, 237, 239, 241, 243, 245, 247, 249, 251, 253, 255, 257, 259, 261, 263, 265, 267, 269, 271, 273, 275, 277, 279, 281, 283, 285, 287, 289, 291, 293, 295, 297, 299, 301, 303, 305, 307, 309, 311, 313, 315, 317, 319, 321, 323, 325, 327, 329, 331, 333, 335, 337, 339, 341, 343, 345, 347, 349, 351, 353, 355, 357, 359, 361, 363, 365, 367, 369, 371, 373, 375, 377, 379, 381, 383, 385, 387, 389, 391 or 393 does not encode a protein of the sequence as depicted in SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394. Accordingly, in one embodiment, the protein encoded by a sequences of a nucleic acid

according to (a) to (k) does not consist of the sequence as depicted in SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394. In a further embodiment, the protein of the present invention is at least 30 % identical to protein sequence as depicted in SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394 and less than 100%, preferably less than 99,999%, 99,99% or 99,9%, more preferably less than 99%, 98%, 97%, 96% or 95% identical to the sequence as depicted in SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394.

[0217.0.0.0] The nucleic acid sequences used in the process are advantageously introduced in a nucleic acid construct, preferably an expression cassette, which makes the expression of the nucleic acid molecules in an organism, advantageously a plant or a microorganism possible.

[0218.0.0.0] Accordingly, the invention also relates to a nucleic acid construct, preferably to an expression construct, comprising the nucleic acid molecule of the present invention functionally linked to one or more regulatory elements or signals.

5 **[0219.0.0.0]** As described herein, the nucleic acid construct can also comprise further genes, which are introduced into the organisms or cells. It is possible and advantageous to introduce into, and express in, the host organisms regulatory genes such as genes for inducers, repressors or enzymes, which, owing to their enzymatic activity, engage in the regulation of one or more genes of a biosynthetic pathway. These genes can be of heterologous or homologous origin. Moreover, further
10 biosynthesis genes may advantageously be present, or else these genes may be located on one or more further nucleic acid constructs. Genes, which are advantageously employed as biosynthesis genes are genes of the amino acid metabolism, of glycolysis, of the tricarboxylic acid metabolism or their combinations. As described herein, regulator sequences or factors can have a positive effect on
15 preferably the gene expression of the genes introduced, thus increasing it. Thus, an enhancement of the regulator elements may advantageously take place at the transcriptional level by using strong transcription signals such as promoters and/or enhancers. In addition, however, an enhancement of translation is also possible, for example by increasing mRNA stability or by inserting a translation enhancer sequence.

20 **[0220.0.0.0]** In principle, the nucleic acid construct can comprise the herein described regulator sequences and further sequences relevant for the expression of the comprised genes. Thus, the nucleic acid construct of the invention can be used as expression cassette and thus can be used directly for introduction into the plant, or else they may be introduced into a vector. Accordingly in one embodiment the nucleic acid
25 construct is an expression cassette comprising a microorganism promoter or a microorganism terminator or both. In another embodiment the expression cassette encompasses a plant promoter or a plant terminator or both.

[0221.0.0.0] Accordingly, in one embodiment, the process according to the invention comprises the following steps:

- 30 (a) introducing of a nucleic acid construct comprising the nucleic acid molecule of the invention or used in the process of the invention or encoding the polypeptide of the present invention or used in the process of the invention; or
- (b) introducing of a nucleic acid molecule, including regulatory sequences or factors, which expression increases the expression of the nucleic acid molecule of the
35 invention or used in the process of the invention or encoding the polypeptide of the present invention or used in the process of the invention in a cell, or an organism or a part thereof, preferably in a plant, plant cell or a microorganism, and

- (c) expressing of the gene product encoded by the nucleic acid construct or the nucleic acid molecule mentioned under (a) or (b) in the cell or the organism.

[0222.0.0.0] After the introduction and expression of the nucleic acid construct the transgenic organism or cell is advantageously cultured and subsequently harvested.

- 5 The transgenic organism or cell may be a prokaryotic or eukaryotic organism such as a microorganism, a non-human animal and plant for example a plant or animal cell, a plant or animal tissue, preferably a crop plant, or a part thereof.

- [0223.0.0.0]** To introduce a nucleic acid molecule into a nucleic acid construct, e.g. as part of an expression cassette, the codogenic gene segment is advantageously subjected to an amplification and ligation reaction in the manner known by a skilled person. It is preferred to follow a procedure similar to the protocol for the Pfu DNA polymerase or a Pfu/Taq DNA polymerase mixture. The primers are selected according to the sequence to be amplified. The primers should expediently be chosen in such a way that the amplificate comprise the codogenic sequence from the start to the stop codon. After the amplification, the amplificate is expediently analyzed. For example, the analysis may consider quality and quantity and be carried out following separation by gel electrophoresis. Thereafter, the amplificate can be purified following a standard protocol (for example Qiagen). An aliquot of the purified amplificate is then available for the subsequent cloning step. The skilled worker generally knows suitable cloning vectors.
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- [0224.0.0.0]** They include, in particular, vectors which are capable of replication in easy to handle cloning systems like as bacterial yeast or insect cell based (e.g. baculovirus expression) systems, that is to say especially vectors which ensure efficient cloning in *E. coli*, and which make possible the stable transformation of plants.
- 25 Vectors, which must be mentioned, in particular are various binary and cointegrated vector systems, which are suitable for the T-DNA-mediated transformation. Such vector systems are generally characterized in that they contain at least the *vir* genes, which are required for the *Agrobacterium*-mediated transformation, and the T-DNA border sequences.

- [0225.0.0.0]** In general, vector systems preferably also comprise further cis-regulatory regions such as promoters and terminators and/or selection markers by means of which suitably transformed organisms can be identified. While *vir* genes and T-DNA sequences are located on the same vector in the case of cointegrated vector systems, binary systems are based on at least two vectors, one of which bears *vir* genes, but no T-DNA, while a second one bears T-DNA, but no *vir* gene. Owing to this fact, the last-mentioned vectors are relatively small, easy to manipulate and capable of replication in *E. coli* and in *Agrobacterium*. These binary vectors include vectors from the series pBIB-HYG, pPZP, pBecks, pGreen. Those, which are preferably used in accordance with the invention, are Bin19, pBI101, pBinAR, pGPTV and pCAMBIA. An
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overview of binary vectors and their use is given by Hellens et al, Trends in Plant Science (2000) 5, 446–451.

[0226.0.0.0] For a vector preparation, vectors may first be linearized using restriction endonuclease(s) and then be modified enzymatically in a suitable manner. Thereafter, the vector is purified, and an aliquot is employed in the cloning step. In the cloning step, the enzyme-cleaved and, if required, purified amplificate is cloned together with similarly prepared vector fragments, using ligase. In this context, a specific nucleic acid construct, or vector or plasmid construct, may have one or else more codogenic gene segments. The codogenic gene segments in these constructs are preferably linked operably to regulatory sequences. The regulatory sequences include, in particular, plant sequences like the above-described promoters and terminators. The constructs can advantageously be propagated stably in microorganisms, in particular *Escherichia coli* and/or *Agrobacterium tumefaciens*, under selective conditions and enable the transfer of heterologous DNA into plants or other microorganisms. In accordance with a particular embodiment, the constructs are based on binary vectors (overview of a binary vector: Hellens et al., 2000). As a rule, they contain prokaryotic regulatory sequences, such as replication origin and selection markers, for the multiplication in microorganisms such as *Escherichia coli* and *Agrobacterium tumefaciens*. Vectors can further contain agrobacterial T-DNA sequences for the transfer of DNA into plant genomes or other eukaryotic regulatory sequences for transfer into other eukaryotic cells, e.g. *Saccharomyces* sp. or other prokaryotic regulatory sequences for the transfer into other prokaryotic cells, e.g. *Corynebacterium* sp. or *Bacillus* sp. For the transformation of plants, the right border sequence, which comprises approximately 25 base pairs, of the total agrobacterial T-DNA sequence is advantageously included. Usually, the plant transformation vector constructs according to the invention contain T-DNA sequences both from the right and from the left border region, which contain expedient recognition sites for site-specific acting enzymes, which, in turn, are encoded by some of the vir genes.

[0227.0.0.0] Suitable host organisms are known to the skilled worker. Advantageous organisms are described further above in the present application. They include in particular eukaryotes or eubacteria, e.g. prokaryotes or archae bacteria. Advantageously host organisms are microorganisms selected from the group consisting of Actinomycetaceae, Bacillaceae, Brevibacteriaceae, Corynebacteriaceae, Enterobacteriaceae, Gordoniaceae, Micrococcaceae, Mycobacteriaceae, Nocardiaceae, Pseudomonaceae, Rhizobiaceae, Streptomycetaceae, Chaetomiaceae, Choanephoraceae, Cryptococcaceae, Cunninghamellaceae, Dematiaceae, Moniliaceae, Mortierellaceae, Mucoraceae, Pythiaceae, Saccharomycetaceae, Saprolegniaceae, Schizosaccharomycetaceae, Sodariaceae, Sporobolomycetaceae, Tuberculariaceae, Adellotheciaceae, Dinophyceae, Ditrichaceae and Prasinophyceae. Preferably are unicellular, microorganisms, e.g. fungi, bacteria or protoza, such as fungi like the genus *Claviceps* or *Aspergillus* or gram-positive bacteria such as the

genera *Bacillus*, *Corynebacterium*, *Micrococcus*, *Brevibacterium*, *Rhodococcus*, *Nocardia*, *Caseobacter* or *Arthrobacter* or gram-negative bacteria such as the genera *Escherichia*, *Flavobacterium* or *Salmonella*, or yeasts such as the genera *Rhodotorula*, *Hansenula*, *Pichia*, *Yarrowia*, *Saccharomyces*, *Schizosaccharomyces* or *Candida*.

- 5 **[0228.0.0.0]** Host organisms which are especially advantageously selected in the process according to the invention are microorganisms selected from the group of the genera and species consisting of *Hansenula anomala*, *Saccharomyces cerevisiae*, *Candida utilis*, *Claviceps purpurea*, *Bacillus circulans*, *Bacillus subtilis*, *Bacillus sp.*, *Brevibacterium albidum*, *Brevibacterium album*, *Brevibacterium cerinum*,
 10 *Brevibacterium flavum*, *Brevibacterium glutamigenes*, *Brevibacterium iodinum*, *Brevibacterium ketoglutamicum*, *Brevibacterium lactofermentum*, *Brevibacterium linens*, *Brevibacterium roseum*, *Brevibacterium saccharolyticum*, *Brevibacterium sp.*, *Corynebacterium acetoacidophilum*, *Corynebacterium acetoglutamicum*, *Corynebacterium ammoniagenes*, *Corynebacterium glutamicum* (= *Micrococcus glutamicum*), *Corynebacterium melassecola*, *Corynebacterium sp.* or *Escherichia coli*, specifically
 15 *Saccharomyces cerevisiae* or *Escherichia coli* K12 and its described strains.

- [0229.0.0.0]** Advantageously preferred in accordance with the invention are host organisms of the genus *Agrobacterium tumefaciens* or plants. Preferred plants are selected from among the families *Aceraceae*, *Anacardiaceae*, *Apiaceae*, *Asteraceae*,
 20 *Apiaceae*, *Betulaceae*, *Boraginaceae*, *Brassicaceae*, *Bromeliaceae*, *Cactaceae*, *Caricaceae*, *Caryophyllaceae*, *Cannabaceae*, *Convolvulaceae*, *Chenopodiaceae*, *Elaeagnaceae*, *Geraniaceae*, *Gramineae*, *Juglandaceae*, *Lauraceae*, *Leguminosae*, *Linaceae*, *Cucurbitaceae*, *Cyperaceae*, *Euphorbiaceae*, *Fabaceae*, *Malvaceae*, *Nymphaeaceae*, *Papaveraceae*, *Rosaceae*, *Salicaceae*, *Solanaceae*, *Arecaceae*,
 25 *Iridaceae*, *Liliaceae*, *Orchidaceae*, *Gentianaceae*, *Labiaceae*, *Magnoliaceae*, *Ranunculaceae*, *Carifolaceae*, *Rubiaceae*, *Scrophulariaceae*, *Ericaceae*, *Polygonaceae*, *Violaceae*, *Juncaceae*, *Poaceae*, perennial grass, fodder crops, vegetables and ornamentals.

- [0230.0.0.0]** Especially preferred are plants selected from the groups of the families
 30 *Apiaceae*, *Asteraceae*, *Brassicaceae*, *Cucurbitaceae*, *Fabaceae*, *Papaveraceae*, *Rosaceae*, *Solanaceae*, *Liliaceae* or *Poaceae*. Especially advantageous are, in particular, crop plants. Accordingly, an advantageous plant preferably belongs to the group of the genus peanut, oilseed rape, canola, sunflower, safflower, olive, sesame, hazelnut, almond, avocado, bay, pumpkin/squash, linseed, soya, pistachio, borage,
 35 maize, wheat, rye, oats, sorghum and millet, triticale, rice, barley, cassava, potato, sugarbeet, fodder beet, egg plant, and perennial grasses and forage plants, oil palm, vegetables (brassicas, root vegetables, tuber vegetables, pod vegetables, fruiting vegetables, onion vegetables, leafy vegetables and stem vegetables), buckwheat, Jerusalem artichoke, broad bean, vetches, lentil, alfalfa, dwarf bean, lupin, clover and
 40 lucerne.

[0231.0.0.0] In order to introduce, into a plant, the nucleic acid molecule of the invention or used in the process according to the invention, it has proved advantageous first to transfer them into an intermediate host, for example a bacterium or a eukaryotic unicellular cell. The transformation into *E. coli*, which can be carried out in a manner known per se, for example by means of heat shock or electroporation, has proved itself expedient in this context. Thus, the transformed *E. coli* colonies can be analysed for their cloning efficiency. This can be carried out with the aid of a PCR. Here, not only the identity, but also the integrity, of the plasmid construct can be verified with the aid of a defined colony number by subjecting an aliquot of the colonies to said PCR. As a rule, universal primers which are derived from vector sequences are used for this purpose, it being possible, for example, for a forward primer to be arranged upstream of the start ATG and a reverse primer to be arranged downstream of the stop codon of the codogenic gene segment. The amplicates are separated by electrophoresis and assessed with regard to quantity and quality.

[0232.0.0.0] The nucleic acid constructs, which are optionally verified, are subsequently used for the transformation of the plants or other hosts, e.g. other eukaryotic cells or other prokaryotic cells. To this end, it may first be necessary to obtain the constructs from the intermediate host. For example, the constructs may be obtained as plasmids from bacterial hosts by a method similar to conventional plasmid isolation.

[0233.0.0.0] The nucleic acid molecule of the invention or used in the process according to the invention can also be introduced into modified viral vectors like baculovirus vectors for expression in insect cells or plant viral vectors like tobacco mosaic virus or potato virus X-based vectors. Approaches leading to the expression of proteins from the modified viral genome including the the nucleic acid molecule of the invention or used in the process according to the invention involve for example the inoculation of tobacco plants with infectious RNA transcribed in vitro from a cDNA copy of the recombinant viral genome. Another approach utilizes the transfection of whole plants from wounds inoculated with *Agrobacterium tumefaciens* containing cDNA copies of recombinant plus-sense RNA viruses. Different vectors and virus are known to the skilled worker for expression in different target eg. production plants.

[0234.0.0.0] A large number of methods for the transformation of plants are known. Since, in accordance with the invention, a stable integration of heterologous DNA into the genome of plants is advantageous, the T-DNA-mediated transformation has proved expedient in particular. For this purpose, it is first necessary to transform suitable vehicles, in particular agrobacteria, with a codogenic gene segment or the corresponding plasmid construct comprising the nucleic acid molecule of the invention. This can be carried out in a manner known per se. For example, said nucleic acid construct of the invention, or said expression construct or said plasmid construct, which has been generated in accordance with what has been detailed above, can be

transformed into competent agrobacteria by means of electroporation or heat shock. In principle, one must differentiate between the formation of cointegrated vectors on the one hand and the transformation with binary vectors on the other hand. In the case of the first alternative, the constructs, which comprise the codogenic gene segment or the nucleic acid molecule of the invention have no T-DNA sequences, but the formation of the cointegrated vectors or constructs takes place in the agrobacteria by homologous recombination of the construct with T-DNA. The T-DNA is present in the agrobacteria in the form of Ti or Ri plasmids in which exogenous DNA has expediently replaced the oncogenes. If binary vectors are used, they can be transferred to agrobacteria either by bacterial conjugation or by direct transfer. These agrobacteria expediently already comprise the vector bearing the vir genes (currently referred to as helper Ti(Ri) plasmid).

[0235.0.0.0] One or more markers may expediently also be used together with the nucleic acid construct, or the vector of the invention and, if plants or plant cells shall be transformed together with the T-DNA, with the aid of which the isolation or selection of transformed organisms, such as agrobacteria or transformed plant cells, is possible. These marker genes enable the identification of a successful transfer of the nucleic acid molecules according to the invention via a series of different principles, for example via visual identification with the aid of fluorescence, luminescence or in the wavelength range of light which is discernible for the human eye, by a resistance to herbicides or antibiotics, via what are known as nutritive markers (auxotrophism markers) or antinutritive markers, via enzyme assays or via phytohormones. Examples of such markers which may be mentioned are GFP (= green fluorescent protein); the luciferin/luciferase system, the β -galactosidase with its colored substrates, for example X-Gal, the herbicide resistances to, for example, imidazolinone, glyphosate, phosphinothricin or sulfonylurea, the antibiotic resistances to, for example, bleomycin, hygromycin, streptomycin, kanamycin, tetracyclin, chloramphenicol, ampicillin, gentamycin, geneticin (G418), spectinomycin or blasticidin, to mention only a few, nutritive markers such as the utilization of mannose or xylose, or antinutritive markers such as the resistance to 2-deoxyglucose. This list is a small number of possible markers. The skilled worker is very familiar with such markers. Different markers are preferred, depending on the organism and the selection method.

[0236.0.0.0] As a rule, it is desired that the plant nucleic acid constructs are flanked by T-DNA at one or both sides of the codogenic gene segment. This is particularly useful when bacteria of the species *Agrobacterium tumefaciens* or *Agrobacterium rhizogenes* are used for the transformation. A method, which is preferred in accordance with the invention, is the transformation with the aid of *Agrobacterium tumefaciens*. However, biolistic methods may also be used advantageously for introducing the sequences in the process according to the invention, and the introduction by means of PEG is also possible. The transformed agrobacteria can be grown in the manner known per se and are thus available for the expedient transformation of the plants. The

plants or plant parts to be transformed are grown or provided in the customary manner. The transformed agrobacteria are subsequently allowed to act on the plants or plant parts until a sufficient transformation rate is reached. Allowing the agrobacteria to act on the plants or plant parts can take different forms. For example, a culture of morphogenic plant cells or tissue may be used. After the T-DNA transfer, antibiotics as a rule eliminate the bacteria, and the regeneration of plant tissue is induced. This is done in particular using suitable plant hormones in order to initially induce callus formation and then to promote shoot development.

[0237.0.0.0] The transfer of foreign genes into the genome of a plant is called transformation. In doing this the methods described for the transformation and regeneration of plants from plant tissues or plant cells are utilized for transient or stable transformation. An advantageous transformation method is the transformation *in planta*. To this end, it is possible, for example, to allow the agrobacteria to act on plant seeds or to inoculate the plant meristem with agrobacteria. It has proved particularly expedient in accordance with the invention to allow a suspension of transformed agrobacteria to act on the intact plant or at least the flower primordia. The plant is subsequently grown on until the seeds of the treated plant are obtained (Clough and Bent, Plant J. (1998) 16, 735–743). To select transformed plants, the plant material obtained in the transformation is, as a rule, subjected to selective conditions so that transformed plants can be distinguished from untransformed plants. For example, the seeds obtained in the above-described manner can be planted and, after an initial growing period, subjected to a suitable selection by spraying. A further possibility consists in growing the seeds, if appropriate after sterilization, on agar plates using a suitable selection agent so that only the transformed seeds can grow into plants. Further advantageous transformation methods, in particular for plants, are known to the skilled worker and are described hereinbelow.

[0238.0.0.0] Further advantageous and suitable methods are protoplast transformation by poly (ethylene glycol)-induced DNA uptake, the „biolistic“ method using the gene cannon – referred to as the particle bombardment method, electroporation, the incubation of dry embryos in DNA solution, microinjection and gene transfer mediated by Agrobacterium. Said methods are described by way of example in B. Jenes et al., Techniques for Gene Transfer, in: Transgenic Plants, Vol. 1, Engineering and Utilization, eds. S.D. Kung and R. Wu, Academic Press (1993) 128-143 and in Potrykus Annu. Rev. Plant Physiol. Plant Molec. Biol. 42 (1991) 205-225). The nucleic acids or the construct to be expressed is preferably cloned into a vector, which is suitable for transforming Agrobacterium tumefaciens, for example pBin19 (Bevan et al., Nucl. Acids Res. 12 (1984) 8711). Agrobacteria transformed by such a vector can then be used in known manner for the transformation of plants, in particular of crop plants such as by way of example tobacco plants, for example by bathing bruised leaves or chopped leaves in an agrobacterial solution and then culturing them in suitable media. The transformation of plants by means of Agrobacterium

tumefaciens is described, for example, by Höfgen and Willmitzer in Nucl. Acid Res. (1988) 16, 9877 or is known inter alia from F.F. White, Vectors for Gene Transfer in Higher Plants; in Transgenic Plants, Vol. 1, Engineering and Utilization, eds. S.D. Kung and R. Wu, Academic Press, 1993, pp. 15-38.

- 5 **[0239.0.0.0]** The abovementioned nucleic acid molecules can be cloned into the nucleic acid constructs or vectors according to the invention in combination together with further genes, or else different genes are introduced by transforming several nucleic acid constructs or vectors (including plasmids) into a host cell, advantageously into a plant cell or a microorganisms.
- 10 **[0240.0.0.0]** In addition to the sequence mentioned in SEQ ID NO: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41 43, 45, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83, 85, 87, 89, 91, 93, 95, 97, 99, 101, 103, 105, 107, 109, 111, 113, 115, 117, 119, 121, 123, 125, 127, 129, 131, 133, 135, 137, 139, 141, 143, 145, 147, 149, 151, 153, 155, 157, 159, 161, 163, 165, 167, 169, 171, 173, 175, 177, 179, 181, 183, 185, 187, 189, 191, 193, 195, 197, 199, 201, 203, 205, 207, 209, 211, 213, 215, 217, 219, 221, 223, 225, 227, 229, 231, 233, 235, 237, 239, 241, 243, 245, 247, 249, 251, 253, 255, 257, 259, 261, 263, 265, 267, 269, 271, 273, 275, 277, 279, 281, 283, 285, 287, 289, 291, 293, 295, 297, 299, 301, 303, 305, 307, 309, 311, 313, 315, 317, 319, 321, 323, 325, 327, 329, 331, 333, 335, 337, 339, 341, 343, 345, 347, 349, 351, 353, 355, 357, 359, 361, 363, 365, 367, 369, 371, 373, 375, 377, 379, 381, 383, 385, 387, 389, 391 or 393 or its derivatives, it is advantageous additionally to express and/or mutate further genes in the organisms. Especially advantageously, additionally at least one further gene of the fine chemical biosynthetic pathway e.g. the amino acid biosynthetic pathway such as for L-tryptophane, L-isoleucine, L-leucine, L-lysine, L-threonine and/or L-methionine to mention only a couple of them is expressed in the organisms such as plants or microorganisms. It is also possible that the regulation of the natural genes has been modified advantageously so that the gene and/or its gene product is no longer subject to the regulatory mechanisms which exist in the organisms. This leads to an increased synthesis of the fine chemicals e.g. the amino acids desired since, for example, feedback regulations no longer exist to the same extent or not at all. In addition it might be advantageously to combine the sequences shown in SEQ ID NO: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41 43, 45, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83, 85, 87, 89, 91, 93, 95, 97, 99, 101, 103, 105, 107, 109, 111, 113, 115, 117, 119, 121, 123, 125, 127, 129, 131, 133, 135, 137, 139, 141, 143, 145, 147, 149, 151, 153, 155, 157, 159, 161, 163, 165, 167, 169, 171, 173, 175, 177, 179, 181, 183, 185, 187, 189, 191, 193, 195, 197, 199, 201, 203, 205, 207, 209, 211, 213, 215, 217, 219, 221, 223, 225, 227, 229, 231, 233, 235, 237, 239, 241, 243, 245, 247, 249, 251, 253, 255, 257, 259, 261, 263, 265, 267, 269, 271, 273, 275, 277, 279, 281, 283, 285, 287, 289, 291, 293, 295, 297, 299, 301, 303, 305, 307, 309, 311, 313, 315, 317, 319, 321, 323, 325, 327, 329, 331, 333, 335, 337, 339, 341, 343, 345, 347, 349, 351, 353, 355, 357, 359,

361, 363, 365, 367, 369, 371, 373, 375, 377, 379, 381, 383, 385, 387, 389, 391 or 393 with genes which generally support or enhances to growth or yield of the target organismen, for example genes which lead to faster growth rate of microorganisms or genes which produces stress-, pathogen, or herbicide resistant plants.

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[0241.0.0.0] In a further embodiment of the process of the invention, therefore, organisms are grown, in which there is simultaneous overexpression of at least one nucleic acid or one of the genes which code for proteins involved in the fine chemical metabolism e.g. the amino acid metabolism, in particular in amino acid synthesis.

- 10 **[0242.0.0.0]** A further advantageous nucleic acid sequence which can be expressed in combination with the sequences used in the process and/or the abovementioned biosynthesis genes is the sequence of the ATP/ADP translocator as described in WO 01/20009. This ATP/ADP translocator leads to an increased synthesis of the essential amino acids lysine and/or methionine. Furthermore, an advantageous nucleic acid sequence coexpressed can be threonine adolase and/or lysine decarboxylase as
- 15 described in the state of the art.

- [0243.0.0.0]** In a further advantageous embodiment of the process of the invention, the organisms used in the process are those in which simultaneously at least one of the aforementioned genes or one of the aforementioned nucleic acids is mutated so
- 20 that the activity of the corresponding proteins is influenced by metabolites to a smaller extent compared with the unmutated proteins, or not at all, and that in particular the production according to the invention of the fine chemical for example of the amino acids is not impaired, or so that their specific enzymatic activity is increased. Less influence means in this connection that the regulation of the enzymic activity is less by
- 25 at least 10%, advantageously at least 20, 30 or 40%, particularly advantageously by at least 50, 60 or 70%, compared with the starting organism, and thus the activity of the enzyme is increased by these figures mentioned compared with the starting organism. An increase in the enzymatic activity means an enzymatic activity which is increased by at least 10%, advantageously at least 20, 30 or 40%, particularly advantageously by
- 30 at least 50, 60 or 70%, compared with the starting organism. This leads to an increased productivity of the fine chemical.

- [0244.0.0.0]** In a further advantageous embodiment of the process of the invention, the organisms used in the process are those in which simultaneously the fine chemical degrading protein is attenuated, in particular by reducing the rate of expression of the
- 35 corresponding gene.

[0245.0.0.0] In another embodiment of the process of the invention, the organisms used in the process are those in which simultaneously at least one of the aforementioned nucleic acids or of the aforementioned genes is mutated in such a way that the enzymatic activity of the corresponding protein is partially reduced or

completely blocked. A reduction in the enzymatic activity means an enzymatic activity, which is reduced by at least 10%, advantageously at least 20, 30 or 40%, particularly advantageously by at least 50, 60 or 70%, preferably more, compared with the starting organism.

- 5 **[0246.0.0.0]** If it is intended to transform the host cell, in particular the plant cell, with several constructs or vectors, the marker of a preceding transformation must be removed or a further marker employed in a following transformation. The markers can be removed from the host cell, in particular the plant cell, as described hereinbelow via methods with which the skilled worker is familiar. In particular plants without a marker,
10 in particular without resistance to antibiotics, are an especially preferred embodiment of the present invention.

- 15 **[0247.0.0.0]** In the process according to the invention, the nucleic acid sequences used in the process according to the invention are advantageously linked operably to one or more regulatory signals in order to increase gene expression. These regulatory
sequences are intended to enable the specific expression of the genes and the expression of protein. Depending on the host organism for example plant or microorganism, this may mean, for example, that the gene is expressed and/or overexpressed after induction only, or that it is expressed and/or overexpressed
20 constitutively. These regulatory sequences are, for example, sequences to which the inductors or repressors bind and which thus regulate the expression of the nucleic acid. In addition to these novel regulatory sequences, or instead of these sequences, the natural regulation of these sequences may still be present before the actual structural genes and, if appropriate, may have been genetically modified so that the natural regulation has been switched off and gene expression has been increased. However,
25 the nucleic acid construct of the invention suitable as expression cassette (= expression construct = gene construct) can also be simpler in construction, that is to say no additional regulatory signals have been inserted before the nucleic acid sequence or its derivatives, and the natural promoter together with its regulation has not been removed. Instead, the natural regulatory sequence has been mutated in such
30 a way that regulation no longer takes place and/or gene expression is increased. These modified promoters can also be introduced on their own before the natural gene in the form of part sequences (= promoter with parts of the nucleic acid sequences according to the invention) in order to increase the activity. Moreover, the gene construct can advantageously also comprise one or more of what are known as
35 enhancer sequences in operable linkage with the promoter, and these enable an increased expression of the nucleic acid sequence. Also, it is possible to insert additional advantageous sequences at the 3' end of the DNA sequences, such as, for example, further regulatory elements or terminators.

- 40 **[0248.0.0.0]** The nucleic acid molecules, which encode proteins according to the invention and nucleic acid molecules, which encode other polypeptides may be present

in one nucleic acid construct or vector or in several ones. Advantageously, only one copy of the nucleic acid molecule of the invention or its encoding genes is present in the nucleic acid construct or vector. Several vectors or nucleic acid construct or vector can be expressed together in the host organism. The nucleic acid molecule or the nucleic acid construct or vector according to the invention can be inserted in a vector and be present in the cell in a free form. If a stable transformation is preferred, a vector is used, which is stably duplicated over several generations or which is else be inserted into the genome. In the case of plants, integration into the plastid genome or, in particular, into the nuclear genome may have taken place. For the insertion of more than one gene in the host genome the genes to be expressed are present together in one gene construct, for example in above-described vectors bearing a plurality of genes.

[0249.0.0.0] As a rule, regulatory sequences for the expression rate of a gene are located upstream (5'), within, and/or downstream (3') relative to to the coding sequence of the nucleic acid molecule of the invention or another codogenic gene segment. They control in particular transcription and/or translation and/or the transcript stability. The expression level is dependent on the conjunction of further cellular regulatory systems, such as the protein biosynthesis and degradation systems of the cell.

[0250.0.0.0] Regulatory sequences include transcription and translation regulating sequences or signals, e.g. sequences located upstream (5'), which concern in particular the regulation of transcription or translation initiation, such as promoters or start codons, and sequences located downstream (3'), which concern in particular the regulation of transcription or translation termination and transcript stability, such as polyadenylation signals or stop codons. Regulatory sequences can also be present in transcribed coding regions as well in transcribed non-coding regions, e.g. in introns, as for example splicing sites. Promoters for the regulation of expression of the nucleic acid molecule according to the invention in a cell and which can be employed are, in principle, all those which are capable of stimulating the transcription of genes in the organisms in question, such as microorganisms or plants. Suitable promoters, which are functional in these organisms, are generally known. They may take the form of constitutive or inducible promoters. Suitable promoters can enable the development- and/or tissue-specific expression in multi-celled eukaryotes; thus, leaf-, root-, flower-, seed-, stomata-, tuber- or fruit-specific promoters may advantageously be used in plants.

[0251.0.0.0] The regulatory sequences or factors can, as described above, have a positive effect on, the expression of the genes introduced, thus increasing their expression. Thus, an enhancement of the expression can advantageously take place at the transcriptional level by using strong transcription signals such as strong promoters and/or strong enhancers. In addition, enhancement of expression on the translational level is also possible, for example by introducing translation enhancer sequences, e.g.,

the Ω enhancer e.g. improving the ribosomal binding to the transcript, or by increasing the stability of the mRNA, e.g. by replacing the 3'UTR coding region by a region encoding a 3'UTR known as conferring an high stability of the transcript or by stabilization of the transcript through the elimination of transcript instability, so that the mRNA molecule is translated more often than the wild type. For example in plants AU-rich elements (AREs) and DST (downstream) elements destabilized transcripts. Mutagenesis studies have demonstrated that residues within two of the conserved domains, the ATAGAT and the GTA regions, are necessary for instability function. Therefore removal or mutation of such elements would obviously lead to more stable transcripts, higher transcript rates and higher protein activity. Translation enhancers are also the "overdrive sequence", which comprises the tobacco mosaic virus 5'-untranslated leader sequence and which increases the protein/RNA ratio (Gallie et al., 1987, Nucl. Acids Research 15:8693-8711)

[0252.0.0.0] Enhancers are generally defined as cis active elements, which can stimulate gene transcription independent of position and orientation. Different enhancers have been identified in plants, which can either stimulate transcription constitutively or tissue or stimuli specific. Well known examples for constitutive enhancers are the enhancer from the 35S promoter (Odell et al., 1985, Nature 313:810-812) or the ocs enhancer (Fromm et al., 1989, Plant Cell 1: 977:984) Another examples are the G-Box motif tetramer which confers high-level constitutive expression in dicot and monocot plants (Ishige et al., 1999, Plant Journal, 18, 443-448) or the petE, a A/T-rich sequence which act as quantitative enhancers of gene expression in transgenic tobacco and potato plants (Sandhu et al., 1998; Plant Mol Biol. 37(5):885-96). Beside that, a large variety of cis-active elements have been described which contribute to specific expression pattern, like organ specific expression or induced expression in response to biotic or abiotic stress. Examples are elements, which provide pathogen or wound-induced expression (Rushton, 2002, Plant Cell, 14, 749-762) or guard cell-specific expression (Plesch, 2001, Plant Journal 28, 455-464).

[0253.0.0.0] Advantageous regulatory sequences for the expression of the nucleic acid molecule according to the invention in microorganisms are present for example in promoters such as the cos, tac, rha, trp, tet, trp-tet, lpp, lac, lpp-lac, lacI^q, T7, T5, T3, gal, trc, ara, SP6, λ -P_R or λ -P_L promoter, which are advantageously used in Gram-negative bacteria. Further advantageous regulatory sequences are present for example in the Gram-positive promoters amy, dnaK, xylS and SPO2, in the yeast or fungal promoters ADC1, MF α , AC, P-60, UASH, MCB, PHO, CYC1, GAPDH, TEF, rp28, ADH. Promoters, which are particularly advantageous, are constitutive, tissue or compartment specific and inducible promoters. In general, "promoter" is understood as meaning, in the present context, a regulatory sequence in a nucleic acid molecule, which mediates the expression of a coding sequence segment of a nucleic acid molecule. In general, the promoter is located upstream to the coding sequence

segment. Some elements, for example expression-enhancing elements such as enhancer may, however, also be located downstream or even in the transcribed region.

5 [0254.0.0.0] In principle, it is possible to use natural promoters together with their regulatory sequences, such as those mentioned above, for the novel process. It is also possible advantageously to use synthetic promoters, either additionally or alone, in particular when they mediate seed-specific expression such as described in, for example, WO 99/16890.

10 [0255.0.0.0] The expression of the nucleic acid molecules used in the process may be desired alone or in combination with other genes or nucleic acids. Multiple nucleic acid molecules conferring the expression of advantageous genes can be introduced via the simultaneous transformation of several individual suitable nucleic acid constructs, i.e. expression constructs, or, preferably, by combining several expression cassettes on one construct. It is also possible to transform several vectors with in each case several expression cassettes stepwise into the recipient organisms.

15 [0256.0.0.0] As described above, the transcription of the genes introduced should advantageously be terminated by suitable terminators at the 3' end of the biosynthesis genes introduced (behind the stop codon). A terminator, which may be used for this purpose is, for example, the OCS1 terminator, the nos3 terminator or the 35S terminator. As is the case with the promoters, different terminator sequences should be
20 used for each gene. Terminators, which are useful in microorganism, are for example the fimA terminator, txn terminator or trp terminator. Such terminators can be rho-dependent or rho-independent.

25 [0257.0.0.0] Different plant promoters such as, for example, the USP, the LegB4-, the DC3 promoter or the ubiquitin promoter from parsley or other herein mentioned promoter and different terminators may advantageously be used in the nucleic acid construct.

30 [0258.0.0.0] In order to ensure the stable integration, into the transgenic plant, of nucleic acid molecules used in the process according to the invention in combination with further biosynthesis genes over a plurality of generations, each of the coding regions used in the process should be expressed under the control of its own, preferably unique, promoter since repeating sequence motifs may lead to recombination events or to silencing or, in plants, to instability of the T-DNA.

35 [0259.0.0.0] The nucleic acid construct is advantageously constructed in such a way that a promoter is followed by a suitable cleavage site for insertion of the nucleic acid to be expressed, advantageously in a polylinker, followed, if appropriate, by a terminator located behind the polylinker. If appropriate, this order is repeated several times so that several genes are combined in one construct and thus can be introduced into the transgenic plant in order to be expressed. The sequence is advantageously repeated

up to three times. For the expression, the nucleic acid sequences are inserted via the suitable cleavage site, for example in the polylinker behind the promoter. It is advantageous for each nucleic acid sequence to have its own promoter and, if appropriate, its own terminator, as mentioned above. However, it is also possible to insert several nucleic acid sequences behind a promoter and, if appropriate, before a terminator if a polycistronic transcription is possible in the host or target cells. In this context, the insertion site, or the sequence of the nucleic acid molecules inserted, in the nucleic acid construct is not decisive, that is to say a nucleic acid molecule can be inserted in the first or last position in the cassette without this having a substantial effect on the expression. However, it is also possible to use only one promoter type in the construct. However, this may lead to undesired recombination events or silencing effects, as said.

[0260.0.0.0] Accordingly, in a preferred embodiment, the nucleic acid construct according to the invention confers expression of the nucleic acid molecule of the invention, and, optionally further genes, in a plant and comprises one or more plant regulatory elements. Said nucleic acid construct according to the invention advantageously encompasses a plant promoter or a plant terminator or a plant promoter and a plant terminator.

[0261.0.0.0] A "plant" promoter comprises regulatory elements, which mediate the expression of a coding sequence segment in plant cells. Accordingly, a plant promoter need not be of plant origin, but may originate from viruses or microorganisms, in particular for example from viruses which attack plant cells.

[0262.0.0.0] The plant promoter can also originate from a plant cell, e.g. from the plant, which is transformed with the nucleic acid construct or vector as described herein. This also applies to other "plant" regulatory signals, for example in "plant" terminators.

[0263.0.0.0] A nucleic acid construct suitable for plant expression preferably comprises regulatory elements which are capable of controlling the expression of genes in plant cells and which are operably linked so that each sequence can fulfill its function. Accordingly, the nucleic acid construct can also comprise transcription terminators. Examples for transcriptional termination are polyadenylation signals. Preferred polyadenylation signals are those which originate from *Agrobacterium tumefaciens* T-DNA, such as the gene 3 of the Ti plasmid pTiACH5, which is known as octopine synthase (Gielen et al., EMBO J. 3 (1984) 835 et seq.) or functional equivalents thereof, but all the other terminators which are functionally active in plants are also suitable.

[0264.0.0.0] The nucleic acid construct suitable for plant expression preferably also comprises other operably linked regulatory elements such as translation enhancers, for

example the overdrive sequence, which comprises the tobacco mosaic virus 5'-untranslated leader sequence, which increases the protein/RNA ratio (Gallie et al., 1987, Nucl. Acids Research 15:8693-8711).

[0265.0.0.0] Other preferred sequences for use in operable linkage in gene expression constructs are targeting sequences, which are required for targeting the gene product into specific cell compartments (for a review, see Kermode, Crit. Rev. Plant Sci. 15, 4 (1996) 285-423 and references cited therein), for example into the vacuole, the nucleus, all types of plastids, such as amyloplasts, chloroplasts, chromoplasts, the extracellular space, the mitochondria, the endoplasmic reticulum, elaioplasts, peroxisomes, glycosomes, and other compartments of cells or extracellular. Sequences, which must be mentioned in this context are, in particular, the signal-peptide- or transit-peptide-encoding sequences which are known per se. For example, plastid-transit-peptide-encoding sequences enable the targeting of the expression product into the plastids of a plant cell. Targeting sequences are also known for eukaryotic and to a lower extent for prokaryotic organisms and can advantageously be operable linked with the nucleic acid molecule of the present invention to achieve an expression in one of said compartments or extracellular.

[0266.0.0.0] For expression in plants, the nucleic acid molecule must, as described above, be linked operably to or comprise a suitable promoter which expresses the gene at the right point in time and in a cell- or tissue-specific manner. Usable promoters are constitutive promoters (Benfey et al., EMBO J. 8 (1989) 2195-2202), such as those which originate from plant viruses, such as 35S CAMV (Franck et al., Cell 21 (1980) 285-294), 19S CaMV (see also US 5352605 and WO 84/02913), 34S FMV (Sanger et al., Plant. Mol. Biol., 14, 1990: 433-443), the parsley ubiquitin promoter, or plant promoters such as the Rubisco small subunit promoter described in US 4,962,028 or the plant promoters PRP1 [Ward et al., Plant. Mol. Biol. 22 (1993)], SSU, PGEL1, OCS [Leisner (1988) Proc Natl Acad Sci USA 85(5): 2553-2557], lib4, usp, mas [Comai (1990) Plant Mol Biol 15 (3):373-381], STLS1, ScBV (Schenk (1999) Plant Mol Biol 39(6):1221-1230), B33, SAD1 or SAD2 (flax promoters, Jain et al., Crop Science, 39 (6), 1999: 1696-1701) or nos [Shaw et al. (1984) Nucleic Acids Res. 12(20):7831-7846]. Stable, constitutive expression of the proteins according to the invention a plant can be advantageous. However, inducible expression of the polypeptide of the invention is advantageous, if a late expression before the harvest is of advantage, as metabolic manipulation may lead to a plant growth retardation.

[0267.0.0.0] The expression of plant genes can also be facilitated as described above via a chemical inducible promoter (for a review, see Gatz 1997, Annu. Rev. Plant Physiol. Plant Mol. Biol., 48:89-108). Chemically inducible promoters are particularly suitable when it is desired to express the gene in a time-specific manner. Examples of such promoters are a salicylic acid inducible promoter (WO 95/19443), and abscisic acid-inducible promoter (EP 335 528), a tetracyclin-inducible promoter

(Gatz et al. (1992) Plant J. 2, 397-404), a cyclohexanol- or ethanol-inducible promoter (WO 93/21334) or others as described herein.

5 [0268.0.0.0] Other suitable promoters are those which react to biotic or abiotic stress conditions, for example the pathogen-induced PRP1 gene promoter (Ward et al., Plant. Mol. Biol. 22 (1993) 361-366), the tomato heat-inducible hsp80 promoter (US 5,187,267), the potato chill-inducible alpha-amylase promoter (WO 96/12814) or the wound-inducible pinII promoter (EP-A-0 375 091) or others as described herein.

10 [0269.0.0.0] Preferred promoters are in particular those which bring about gene expression in tissues and organs in which the biosynthesis of fine chemical takes place, in seed cells, such as endosperm cells and cells of the developing embryo. Suitable promoters are the oilseed rape napin gene promoter (US 5,608,152), the Vicia faba USP promoter (Baeumlein et al., Mol Gen Genet, 1991, 225 (3):459-67), the Arabidopsis oleosin promoter (WO 98/45461), the Phaseolus vulgaris phaseolin promoter (US 5,504,200), the Brassica Bce4 promoter (WO 91/13980), the bean arc5 promoter, the carrot DcG3 promoter, or the Legumin B4 promoter (LeB4; Baeumlein et al., 1992, Plant Journal, 2 (2):233-9), and promoters which bring about the seed-specific expression in monocotyledonous plants such as maize, barley, wheat, rye, rice and the like. Advantageous seed-specific promoters are the sucrose binding protein promoter (WO 00/26388), the phaseolin promoter and the napin promoter. Suitable promoters which must be considered are the barley lpt2 or lpt1 gene promoter (WO 95/15389 and WO 95/23230), and the promoters described in WO 99/16890 (promoters from the barley hordein gene, the rice glutelin gene, the rice oryzin gene, the rice prolamin gene, the wheat gliadin gene, the wheat glutelin gene, the maize zein gene, the oat glutelin gene, the sorghum kasirin gene and the rye secalin gene). 25 Further suitable promoters are Amy32b, Amy 6-6 and Aleurain.[US 5,677,474], Bce4 (oilseed rape) [US 5,530,149], glycinin (soya) [EP 571 741], phosphoenolpyruvate carboxylase (soya) [JP 06/62870], ADR12-2 (soya) [WO 98/08962], isocitrate lyase (oilseed rape) [US 5,689,040] or α -amylase (barley) [EP 781 849]. Other promoters which are available for the expression of genes in plants are leaf-specific promoters 30 such as those described in DE-A 19644478 or light-regulated promoters such as, for example, the pea petE promoter.

[0270.0.0.0] Further suitable plant promoters are the cytosolic FBPase promoter or the potato ST-LSI promoter (Stockhaus et al., EMBO J. 8, 1989, 2445), the Glycine max phosphoribosylpyrophosphate amidotransferase promoter (GenBank Accession 35 No. U87999) or the node-specific promoter described in EP-A-0 249 676.

[0271.0.0.0] Other promoters, which are particularly suitable, are those, which bring about plastid-specific expression. Suitable promoters such as the viral RNA polymerase promoter are described in WO 95/16783 and WO 97/06250, and the Arabidopsis clpP promoter, which is described in WO 99/46394.

[0272.0.0.0] Other promoters, which are used for the strong expression of heterologous sequences in as many tissues as possible, in particular also in leaves, are, in addition to several of the abovementioned viral and bacterial promoters, preferably, plant promoters of actin or ubiquitin genes such as, for example, the rice actin1 promoter. Further examples of constitutive plant promoters are the sugarbeet V-ATPase promoters (WO 01/14572). Examples of synthetic constitutive promoters are the Super promoter (WO 95/14098) and promoters derived from G-boxes (WO 94/12015). If appropriate, chemical inducible promoters may furthermore also be used, compare EP-A 388186, EP-A 335528, WO 97/06268.

[0273.0.0.0] As already mentioned herein, further regulatory sequences, which may be expedient, if appropriate, also include sequences, which target the transport and/or the localization of the expression products. Sequences, which must be mentioned in this context are, in particular, the signal-peptide- or transit-peptide-encoding sequences which are known per se. For example, plastid-transit-peptide-encoding sequences enable the targeting of the expression product into the plastids of a plant cell.

[0274.0.0.0] Preferred recipient plants are, as described above, in particular those plants, which can be transformed in a suitable manner. These include monocotyledonous and dicotyledonous plants. Plants which must be mentioned in particular are agriculturally useful plants such as cereals and grasses, for example Triticum spp., Zea mays, Hordeum vulgare, oats, Secale cereale, Oryza sativa, Pennisetum glaucum, Sorghum bicolor, Triticale, Agrostis spp., Cenchrus ciliaris, Dactylis glomerata, Festuca arundinacea, Lolium spp., Medicago spp. and Saccharum spp., legumes and oil crops, for example Brassica juncea, Brassica napus, Glycine max, Arachis hypogaea, Gossypium hirsutum, Cicer arietinum, Helianthus annuus, Lens culinaris, Linum usitatissimum, Sinapis alba, Trifolium repens and Vicia narbonensis, vegetables and fruits, for example bananas, grapes, Lycopersicon esculentum, asparagus, cabbage, watermelons, kiwi fruit, Solanum tuberosum, Beta vulgaris, cassava and chicory, trees, for example Coffea species, Citrus spp., Eucalyptus spp., Picea spp., Pinus spp. and Populus spp., medicinal plants and trees, and flowers..

[0275.0.0.0] One embodiment of the present invention also relates to a method for generating a vector, which comprises the insertion, into a vector, of the nucleic acid molecule characterized herein, the nucleic acid molecule according to the invention or the expression cassette according to the invention. The vector can, for example, be introduced in to a cell, e.g. a microorganism or a plant cell, as described herein for the nucleic acid construct, or below under transformation or transfection or shown in the examples. A transient or stable transformation of the host or target cell is possible, however, a stable transformation is preferred. The vector according to the invention is preferably a vector, which is suitable for expressing the polypeptide according to the invention in a plant. The method can thus also encompass one or more steps for

integrating regulatory signals into the vector, in particular signals, which mediate the expression in microorganisms or plants.

5 [0276.0.0.0] Accordingly, the present invention also relates to a vector comprising the nucleic acid molecule characterized herein as part of a nucleic acid construct suitable for plant expression or the nucleic acid molecule according to the invention.

10 [0277.0.0.0] The advantageous vectors of the invention comprise the nucleic acid molecules which encode proteins according to the invention, nucleic acid molecules which are used in the process, or nucleic acid construct suitable for plant expression comprising the nucleic acid molecules used, either alone or in combination with further genes such as the biosynthesis or regulatory genes of the fine chemical metabolism e.g. with the genes mentioned herein above. In accordance with the invention, the term "vector" refers to a nucleic acid molecule, which is capable of transporting another nucleic acid to which it is linked. One type of vector is a "plasmid", which means a circular double-stranded DNA loop into which additional DNA segments can be ligated.

15 A further type of vector is a viral vector, it being possible to ligate additional nucleic acids segments into the viral genome. Certain vectors are capable of autonomous replication in a host cell into which they have been introduced (for example bacterial vectors with bacterial replication origin). Other preferred vectors are advantageously completely or partly integrated into the genome of a host cell when they are introduced into the host cell and thus replicate together with the host genome. Moreover, certain vectors are capable of controlling the expression of genes with which they are in operable linkage. In the present context, these vectors are referred to as "expression vectors". As mentioned above, they are capable of autonomous replication or may be integrated partly or completely into the host genome. Expression vectors, which are

25 suitable for DNA recombination techniques usually, take the form of plasmids. In the present description, "plasmid" and "vector" can be used interchangeably since the plasmid is the most frequently used form of a vector. However, the invention is also intended to encompass these other forms of expression vectors, such as viral vectors, which exert similar functions. The term vector is furthermore also to encompass other

30 vectors which are known to the skilled worker, such as phages, viruses such as SV40, CMV, TMV, transposons, IS elements, phasmids, phagemids, cosmids, and linear or circular DNA.

[0278.0.0.0] The recombinant expression vectors which are advantageously used in the process comprise the nucleic acid molecules according to the invention or the

35 nucleic acid construct according to the invention in a form which is suitable for expressing, in a host cell, the nucleic acid molecules according to the invention or described herein. Accordingly, the the recombinant expression vectors comprise one or more regulatory signals selected on the basis of the host cells to be used for the expression, in operable linkage with the nucleic acid sequence to be expressed.

[0279.0.0.0] In a recombinant expression vector, "operable linkage" means that the nucleic acid molecule of interest is linked to the regulatory signals in such a way that expression of the nucleic acid molecule is possible: they are linked to one another in such a way that the two sequences fulfill the predicted function assigned to the sequence (for example in an in-vitro transcription/translation system, or in a host cell if the vector is introduced into the host cell).

[0280.0.0.0] The term "regulatory sequence" is intended to comprise promoters, enhancers and other expression control elements (for example polyadenylation signals). These regulatory sequences are described, for example, in Goeddel: Gene Expression Technology: Methods in Enzymology 185, Academic Press, San Diego, CA (1990), or see: Gruber and Crosby, in: Methods in Plant Molecular Biology and Biotechnology, CRC Press, Boca Raton, Florida, Ed.: Glick and Thompson, chapter 7, 89-108, including the references cited therein. Regulatory sequences encompass those, which control the constitutive expression of a nucleotide sequence in many types of host cells and those which control the direct expression of the nucleotide sequence in specific host cells only, and under specific conditions. The skilled worker knows that the design of the expression vector may depend on factors such as the selection of the host cell to be transformed, the extent to which the desired protein is expressed, and the like. A preferred selection of regulatory sequences is described above, for example promoters, terminators, enhancers and the like. The term regulatory sequence is to be considered as being encompassed by the term regulatory signal. Several advantageous regulatory sequences, in particular promoters and terminators are described above. In general, the regulatory sequences described as advantageous for nucleic acid construct suitable for expression are also applicable for vectors.

[0281.0.0.0] The recombinant expression vectors used can be designed specifically for the expression, in prokaryotic and/or eukaryotic cells, of nucleic acid molecules used in the process. This is advantageous since intermediate steps of the vector construction are frequently carried out in microorganisms for the sake of simplicity. For example, the genes according to the invention and other genes can be expressed in bacterial cells, insect cells (using baculovirus expression vectors), yeast cells and other fungal cells [Romanos (1992), Yeast 8:423-488; van den Hondel, (1991), in: More Gene Manipulations in Fungi, J.W. Bennet & L.L. Lasure, Ed., pp. 396-428: Academic Press: San Diego; and van den Hondel, C.A.M.J.J. (1991), in: Applied Molecular Genetics of Fungi, Peberdy, J.F., et al., Ed., pp. 1-28, Cambridge University Press: Cambridge], algae [Falciatore et al., 1999, Marine Biotechnology.1, 3:239-251] using vectors and following a transformation method as described in WO 98/01572, and preferably in cells of multi-celled plants [see Schmidt, R. and Willmitzer, L. (1988) Plant Cell Rep.:583-586; Plant Molecular Biology and Biotechnology, C Press, Boca Raton, Florida, chapter 6/7, pp.71-119 (1993); F.F. White, in: Transgenic Plants, Bd. 1, Engineering and Utilization, Ed.: Kung and R. Wu, Academic Press (1993), 128-43;

Potrykus, Annu. Rev. Plant Physiol. Plant Molec. Biol. 42 (1991), 205-225 (and references cited therein)]. Suitable host cells are furthermore discussed in Goeddel, Gene Expression Technology: Methods in Enzymology 185, Academic Press, San Diego, CA (1990). As an alternative, the sequence of the recombinant expression
5 vector can be transcribed and translated in vitro, for example using T7 promotor-regulatory sequences and T7 polymerase.

[0282.0.0.0] Proteins can be expressed in prokaryotes using vectors comprising constitutive or inducible promoters, which control the expression of fusion proteins or nonfusion proteins. Typical fusion expression vectors are, inter alia, pGEX (Pharmacia
10 Biotech Inc; Smith, D.B., and Johnson, K.S. (1988) Gene 67:31-40), pMAL (New England Biolabs, Beverly, MA) and pRIT5 (Pharmacia, Piscataway, NJ), in which glutathione-S-transferase (GST), maltose-E-binding protein or protein A is fused with the recombinant target protein. Examples of suitable inducible nonfusion E. coli expression vectors are, inter alia, pTrc (Amann et al. (1988) Gene 69:301-315) and
15 pET 11d [Studier et al., Gene Expression Technology: Methods in Enzymology 185, Academic Press, San Diego, California (1990) 60-89]. The target gene expression of the pTrc vector is based on the transcription of a hybrid trp-lac fusion promoter by the host RNA polymerase. The target gene expression from the pET 11d vector is based on the transcription of a T7-gn10-lac fusion promoter, which is mediated by a
20 coexpressed viral RNA polymerase (T7 gn1). This viral polymerase is provided by the host strains BL21 (DE3) or HMS174 (DE3) by a resident λ -prophage, which harbors a T7 gn1 gene under the transcriptional control of the lacUV 5 promoter.

[0283.0.0.0] Other vectors which are suitable in prokaryotic organisms are known to the skilled worker; these vectors are for example in E. coli pLG338, pACYC184, the
25 pBR series, such as pBR322, the pUC series such as pUC18 or pUC19, the M113mp series, pKC30, pRep4, pHS1, pHS2, pPLc236, pMBL24, pLG200, pUR290, pIN-III¹¹³, B1, λ gt11 or pBdCl, in Streptomyces pIJ101, pIJ364, pIJ702 or pIJ361, in Bacillus pUB110, pC194 or pBD214, in Corynebacterium pSA77 or pAJ667.

[0284.0.0.0] In a further embodiment, the expression vector is a yeast expression
30 vector. Examples of vectors for expression in the yeasts *S. cerevisiae* encompass pYeDesaturasec1 (Baldari et al. (1987) Embo J. 6:229-234), pMFa (Kurjan and Herskowitz (1982) Cell 30:933-943), pJRY88 (Schultz et al. (1987) Gene 54:113-123) and pYES2 (Invitrogen Corporation, San Diego, CA). Vectors and methods for the construction of vectors which are suitable for use in other fungi, such as the
35 filamentous fungi, encompass those which are described in detail in: van den Hondel, C.A.M.J.J. [(1991), J.F. Peberdy, Ed., pp. 1-28, Cambridge University Press: Cambridge; or in: More Gene Manipulations in Fungi; J.W. Bennet & L.L. Lasure, Ed., pp. 396-428: Academic Press: San Diego]. Examples of other suitable yeast vectors are \square M, pAG-1, YEpl6, YEpl3 or pEMBLYe23.

[0285.0.0.0] Further vectors, which may be mentioned by way of example, are pALS1, pIL2 or pBB116 in fungi or pLGV23, pGHlac⁺, pBIN19, pAK2004 or pDH51 in plants.

5 **[0286.0.0.0]** As an alternative, the nucleic acid sequences can be expressed in insect cells using baculovirus expression vectors. Baculovirus vectors which are available for expressing proteins in cultured insect cells (for example Sf9 cells) encompass the pAc series (Smith et al. (1983) Mol. Cell Biol. 3:2156-2165) and the pVL series (Lucklow and Summers (1989) Virology 170:31-39).

10 **[0287.0.0.0]** The abovementioned vectors are only a small overview of potentially suitable vectors. Further plasmids are known to the skilled worker and are described, for example, in: Cloning Vectors (Ed. Pouwels, P.H., et al., Elsevier, Amsterdam-New York-Oxford, 1985, ISBN 0 444 904018). Further suitable expression systems for prokaryotic and eukaryotic cells, see the chapters 16 and 17 by Sambrook, J., Fritsch, E.F., and Maniatis, T., Molecular Cloning: A Laboratory Manual, 2nd Edition, Cold
15 Spring Harbor Laboratory, Cold Spring Harbor Laboratory Press, Cold Spring Harbor, NY, 1989.

[0288.0.0.0] Accordingly, one embodiment of the invention relates to a vector where the nucleic acid molecule according to the invention is linked operably to regulatory sequences which permit the expression in a prokaryotic or eukaryotic or in a
20 prokaryotic and eukaryotic host.

[0289.0.0.0] Accordingly, one embodiment of the invention relates to a host cell, which has been transformed stably or transiently with the vector according to the invention or the nucleic acid molecule according to the invention or the nucleic acid construct according to the invention.

25 **[0290.0.0.0]** Depending on the host organism, the organisms used in the process according to the invention are cultured or grown in a manner with which the skilled worker is familiar. As a rule, microorganisms are grown in a liquid medium comprising a carbon source, usually in the form of sugars, a nitrogen source, usually in the form of organic nitrogen sources such as yeast extract or salts such as ammonium sulfate,
30 trace elements such as iron salts, manganese salts, magnesium salts, and, if appropriate, vitamins, at temperatures between 0°C and 100°C, preferably between 10°C and 60°C, while passing in oxygen. In the event the microorganism is anaerobe, no oxygen is blown through the culture medium. The pH value of the liquid nutrient medium may be kept constant, that is to say regulated during the culturing phase, or
35 not. The organisms may be cultured batchwise, semibatchwise or continuously. Nutrients may be provided at the beginning of the fermentation or fed in semicontinuously or continuously.

[0291.0.0.0] The fine chemical produced can be isolated from the organism by methods with which the skilled worker is familiar. For example via extraction, salt precipitation and/or ion-exchange chromatography etc. To this end, the organisms may be disrupted beforehand. The process according to the invention can be conducted
5 batchwise, semibatchwise or continuously. A summary of known culture and isolation techniques can be found in the textbook by Chmiel [Bioprozeßtechnik 1, Einführung in die Bioverfahrenstechnik (Gustav Fischer Verlag, Stuttgart, 1991)], Demain et al. (Industrial Microbiology and Biotechnology, second edition, ASM Press, Washington, D.C., 1999, ISBN 1-55581-128-0] or in the textbook by Storhas [Bioreaktoren und
10 periphere Einrichtungen (Vieweg Verlag, Braunschweig/Wiesbaden, 1994)].

[0292.0.0.0] In one embodiment, the present invention relates to a polypeptide encoded by the nucleic acid molecule according to the present invention, preferably conferring an increase in the fine chemical content in an organism or cell after increasing the expression or activity.

15 **[0293.0.0.0]** The present invention also relates to a process for the production of a polypeptide according to the present invention, the polypeptide being expressed in a host cell according to the invention, preferably in a microorganism or a transgenic plant cell.

20 **[0294.0.0.0]** In one embodiment, the nucleic acid molecule used in the process for the production of the polypeptide is derived from a microorganism, preferably from a prokaryotic or protozoic cell with a eukaryotic organism as host cell. E.g., in one embodiment the polypeptide is produced in a plant cell or plant with a nucleic acid molecule derived from a prokaryote or a fungus or an alga or another microorganism but not from plant.

25 **[0295.0.0.0]** The skilled worker knows that protein and DNA expressed in different organisms differ in many respects and properties, e.g. DNA modulation and imprinting, such as methylation or post-translational modification, as for example glucosylation, phosphorylation, acetylation, myristoylation, ADP-ribosylation, farnesylation, carboxylation, sulfation, ubiquination, etc. though having the same coding sequence.
30 Preferably, the cellular expression control of the corresponding protein differs accordingly in the control mechanisms controlling the activity and expression of an endogenous protein or another eukaryotic protein. One major difference between proteins expressed in prokaryotic or eukaryotic organisms is the amount and pattern of glycosylation. For example in E. coli there are no glycosylated proteins. Proteins
35 expressed in yeasts have high mannose content in the glycosylated proteins, whereas in plants the glycosylation pattern is complex.

[0296.0.0.0] The polypeptide of the present invention is preferably produced by recombinant DNA techniques. For example, a nucleic acid molecule encoding the

protein is cloned into a vector (as described above), the vector is introduced into a host cell (as described above) and said polypeptide is expressed in the host cell. Said polypeptide can then be isolated from the cells by an appropriate purification scheme using standard protein purification techniques. Alternative to recombinant expression, the polypeptide or peptide of the present invention can be synthesized chemically using standard peptide synthesis techniques.

[0297.0.0.0] Moreover, native polypeptides conferring the increase of the fine chemical in an organism or part thereof can be isolated from cells (e.g., endothelial cells), for example using the antibody of the present invention as described below, in particular, an anti-YNL090W protein antibody or an antibody against polypeptides as depicted in SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394, which can be produced by standard techniques utilizing the polypeptid of the present invention or fragment thereof, i.e., the polypeptide of this invention. Preferred are monoclonal antibodies.

[0298.0.0.0] In one embodiment, the present invention relates to a polypeptide having the amino acid sequence encoded by a nucleic acid molecule of the invention or obtainable by a process of the invention. Said polypeptide confers preferably the aforementioned activity, in particular, the polypeptide confers the increase of the fine chemical in a cell or an organism or a part thereof after increasing the cellular activity, e.g. by increasing the expression or the specific activity of the polypeptide.

[0299.0.0.0] In one embodiment, the present invention relates to a polypeptide having the sequence as depicted in SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320,

322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394 or as coded by the nucleic acid molecule as depicted in SEQ ID NO: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, 43, 45, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83, 85, 87, 89, 91, 93, 95, 97, 99, 101, 103, 105, 107, 109, 111, 113, 115, 117, 119, 121, 123, 125, 127, 129, 131, 133, 135, 137, 139, 141, 143, 145, 147, 149, 151, 153, 155, 157, 159, 161, 163, 165, 167, 169, 171, 173, 175, 177, 179, 181, 183, 185, 187, 189, 191, 193, 195, 197, 199, 201, 203, 205, 207, 209, 211, 213, 215, 217, 219, 221, 223, 225, 227, 229, 231, 233, 235, 237, 239, 241, 243, 245, 247, 249, 251, 253, 255, 257, 259, 261, 263, 265, 267, 269, 271, 273, 275, 277, 279, 281, 283, 285, 287, 289, 291, 293, 295, 297, 299, 301, 303, 305, 307, 309, 311, 313, 315, 317, 319, 321, 323, 325, 327, 329, 331, 333, 335, 337, 339, 341, 343, 345, 347, 349, 351, 353, 355, 357, 359, 361, 363, 365, 367, 369, 371, 373, 375, 377, 379, 381, 383, 385, 387, 389, 391 or 393 or functional homologues thereof.

[0300.0.0.0] In one advantageous embodiment, in the method of the present invention the activity of a polypeptide is increased comprising or consisting of the consensus sequence as depicted in SEQ ID NO: 47, SEQ ID NO: 48, SEQ ID NO: 49, SEQ ID NO: 50, SEQ ID NO: 51, SEQ ID NO: 52, SEQ ID NO: 397, SEQ ID NO: 398, SEQ ID NO: 399 and/or SEQ ID NO: 400 and in one another embodiment, the present invention relates to a polypeptide comprising or consisting of the consensus sequence as depicted in SEQ ID NO: 47, SEQ ID NO: 48, SEQ ID NO: 49, SEQ ID NO: 50, SEQ ID NO: 51, SEQ ID NO: 52, SEQ ID NO: 397, SEQ ID NO: 398, SEQ ID NO: 399 and/or SEQ ID NO: 400 whereby 20 or less, preferably 15 or 10, preferably 9, 8, 7, or 6, more preferred 5 or 4, even more preferred 3, even more preferred 2, even more preferred 1, most preferred 0 of the amino acids positions indicated can be replaced by any amino acid.

[0301.0.0.0] In one embodiment not more than 15%, preferably 10%, even more preferred 5%, 4%, 3%, or 2%, most preferred 1% or 0% of the amino acid position indicated by a letter are/is replaced another amino acid.

[0302.0.0.0] In one embodiment 20 or less, preferably 15 or 10, preferably 9, 8, 7, or 6, more preferred 5 or 4, even more preferred 3, even more preferred 2, even more preferred 1, most preferred 0 amino acids are inserted into the consensus sequence.

[0303.0.0.0] The consensus sequences of specified domains were derived from a multiple alignment of all sequences. The consensus sequences are disclosed under SEQ ID NO: 47, SEQ ID NO: 48, SEQ ID NO: 49, SEQ ID NO: 50, SEQ ID NO: 51, SEQ ID NO: 52, SEQ ID NO: 397, SEQ ID NO: 398, SEQ ID NO: 399 and/or SEQ ID NO: 400. The letters represent the three letter amino acid code and indicate that the amino acids are conserved in all aligned proteins. The letter Xaa stands for amino acids, which are not conserved in all sequences. In some cases of the sequences as

depicted in SEQ ID NO: 47, SEQ ID NO: 48, SEQ ID NO: 49, SEQ ID NO: 50, SEQ ID NO: 51, SEQ ID NO: 52, SEQ ID NO: 397, SEQ ID NO: 398, SEQ ID NO: 399 and/or SEQ ID NO: 400 preferred amino acids are mentioned in the sequence protocol in others all natural amino acids are possible. Figur 1 shows an alignment with part of the sequences in the one letter amino acid code. The conserved sequences are framed.

[0304.0.0.0] The alignment was performed either with the Software AlignX (sept 25, 2002) a component of Vector NTI Suite 8.0 , InforMax™, Invitrogen™ life science software, U.S. Main Office, 7305 Executive Way, Frederick, MD 21704, USA with the following settings: For pairwise alignments: gap opening penalty: 10,0; gap extension penalty 0,1. For multiple alignments: Gap opening penalty: 10,0; Gap extension penalty: 0,1; Gap separation penalty range: 8; Residue substitution matrix: blosum62; Hydrophilic residues: G P S N D Q E K R; Transition weighting: 0,5; Consensus calculation options: Residue fraction for consensus: 1 or preferably the percent sequence identity between two nucleic acid or polypeptide sequences was determined using the Vector NTI 6.0 (PC) software package (InforMax, 7600 Wisconsin Ave., Bethesda, MD 20814). A gap opening penalty of 15 and a gap extension penalty of 6.66 are used for determining the percent identity of two nucleic acids. A gap opening penalty of 10 and a gap extension penalty of 0.1 are used for determining the percent identity of two polypeptides. All other parameters are set at the default settings. For purposes of a multiple alignment (Clustal W algorithm), the gap opening penalty is 10, and the gap extension penalty is 0.05 with blosum62 matrix.

[0305.0.0.0] In one advantageous embodiment, the method of the present invention comprises the increasing of a polypeptide comprising or consisting of plant or microorganism specific consensus sequences,

In one embodiment, said polypeptide of the invention distinguishes over the sequence as depicted in SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394 by one or more amino acids. In one embodiment, polypeptide distinguishes from the sequence as depicted in SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120,

122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394 by more than 5, 6, 7, 8 or 9 amino acids, preferably by more than 10, 15, 20, 25 or 30 amino acids, even more preferred are more than 40, 50, or 60 amino acids and, preferably, the sequence of the polypeptide of the invention distinguishes from the sequence as depicted in SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394 by not more than 80% or 70% of the amino acids, preferably not more than 60% or 50%, more preferred not more than 40% or 30%, even more preferred not more than 20% or 10%. In an other embodiment, said polypeptide of the invention does not consist of the sequence as depicted in SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394.

[0306.0.0.0] In one embodiment, the polypeptide of the invention comprises any one of the sequences not known to the public before. In one embodiment, the polypeptide of the invention originates from a non-plant cell, in particular from a microorganism, and was expressed in a plant cell. In one embodiment, the present invention relates to a

polypeptide encoded by the nucleic acid molecule of the invention or used in the process of the invention for which an activity has not been described yet.

[0307.0.0.0] In one embodiment, the invention relates to polypeptide conferring an increase in the fine chemical in an organism or part being encoded by the nucleic acid molecule of the invention or used in the process of the invention and having a sequence which distinguishes from the sequence as depicted in SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394 by one or more amino acids. In an other embodiment, said polypeptide of the invention does not consist of the sequence as depicted in SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394. In a further embodiment, said polypeptide of the present invention is less than 100%, 99,999%, 99,99%, 99,9% or 99% identical. In one embodiment, said polypeptide does not consist of the sequence encoded by the nucleic acid molecules as depicted in SEQ ID NO: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, 43, 45, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83, 85, 87, 89, 91, 93, 95, 97, 99, 101, 103, 105, 107, 109, 111, 113, 115, 117, 119, 121, 123, 125, 127, 129, 131, 133, 135, 137, 139, 141, 143, 145, 147, 149, 151, 153, 155, 157, 159, 161, 163, 165, 167, 169, 171, 173, 175, 177, 179, 181, 183, 185, 187, 189, 191, 193, 195, 197, 199, 201, 203, 205, 207, 209, 211, 213, 215, 217, 219, 221, 223, 225, 227, 229, 231, 233, 235, 237, 239, 241, 243, 245, 247, 249, 251, 253, 255, 257, 259, 261, 263, 265, 267, 269, 271, 273, 275, 277, 279, 281, 283, 285, 287, 289, 291, 293, 295, 297, 299, 301, 303, 305, 307, 309, 311, 313, 315, 317, 319, 321, 323, 325, 327, 329, 331, 333, 335, 337,

339, 341, 343, 345, 347, 349, 351, 353, 355, 357, 359, 361, 363, 365, 367, 369, 371, 373, 375, 377, 379, 381, 383, 385, 387, 389, 391 or 393.

[0308.0.0.0] In one embodiment, the present invention relates to a polypeptide having the biological activity represented by a protein as depicted in SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394 and which distinguishes over the aforementioned sequences by one or more amino acids, preferably by more than 5, 6, 7, 8 or 9 amino acids, preferably by more than 10, 15, 20, 25 or 30 amino acids, even more preferred are more than 40, 50, or 60 amino acids but even more preferred by less than 70% of the amino acids, more preferred by less than 50%, even more preferred by less than 30% or 25%, more preferred are 20% or 15%, even more preferred are less than 10%.

[0309.0.0.0] The terms "protein" and "polypeptide" used in this application are interchangeable. "Polypeptide" refers to a polymer of amino acids (amino acid sequence) and does not refer to a specific length of the molecule. Thus peptides and oligopeptides are included within the definition of polypeptide. This term does also refer to or include post-translational modifications of the polypeptide, for example, glycosylations, acetylations, phosphorylations and the like. Included within the definition are, for example, polypeptides containing one or more analogs of an amino acid (including, for example, unnatural amino acids, etc.), polypeptides with substituted linkages, as well as other modifications known in the art, both naturally occurring and non-naturally occurring.

[0310.0.0.0] Preferably, the polypeptide is isolated. An "isolated" or "purified" protein or nucleic acid molecule or biologically active portion thereof is substantially free of cellular material when produced by recombinant DNA techniques or chemical precursors or other chemicals when chemically synthesized.

[0311.0.0.0] The language "substantially free of cellular material" includes preparations of the polypeptide of the invention in which the protein is separated from cellular components of the cells in which it is naturally or recombinantly produced. In one embodiment, the language "substantially free of cellular material" includes

preparations having less than about 30% (by dry weight) of "contaminating protein", more preferably less than about 20% of "contaminating protein", still more preferably less than about 10% of "contaminating protein", and most preferably less than about 5% "contaminating protein". The term "Contaminating protein" relates to polypeptides, which are not polypeptides of the present invention. When the polypeptide of the present invention or biologically active portion thereof is recombinantly produced, it is also preferably substantially free of culture medium, i.e., culture medium represents less than about 20%, more preferably less than about 10%, and most preferably less than about 5% of the volume of the protein preparation. The language "substantially free of chemical precursors or other chemicals" includes preparations in which the polypeptide of the present invention is separated from chemical precursors or other chemicals, which are involved in the synthesis of the protein. The language "substantially free of chemical precursors or other chemicals" includes preparations having less than about 30% (by dry weight) of chemical precursors or non-polypeptide of the invention chemicals, more preferably less than about 20% chemical precursors or non-polypeptide of the invention chemicals, still more preferably less than about 10% chemical precursors or non-polypeptide of the invention chemicals, and most preferably less than about 5% chemical precursors or non-polypeptide of the invention chemicals. In preferred embodiments, isolated proteins or biologically active portions thereof lack contaminating proteins from the same organism from which the polypeptide of the present invention is derived. Typically, such proteins are produced by recombinant techniques.

[0312.0.0.0] A polypeptide of the invention can participate in the process of the present invention. The polypeptide or a portion thereof comprises preferably an amino acid sequence which is sufficiently homologous to an amino acid sequence as depicted in SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394 such that the protein or portion thereof maintains the ability to confer the activity of the present invention. The portion of the protein is preferably a biologically active portion as described herein. Preferably, the polypeptide used in the process of the invention has an amino acid sequence identical as shown in SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78,

80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394.

[0313.0.0.0] Further, the polypeptide can have an amino acid sequence which is encoded by a nucleotide sequence which hybridizes, preferably hybridizes under stringent conditions as described above, to a nucleotide sequence of the nucleic acid molecule of the present invention. Accordingly, the polypeptide has an amino acid sequence which is encoded by a nucleotide sequence that is at least about 35%, 40%, 45%, 50%, 55%, 60%, 65% or 70%, preferably at least about 75%, 80%, 85% or 90, and more preferably at least about 91%, 92%, 93%, 94% or 95%, and even more preferably at least about 96%, 97%, 98%, 99% or more homologous to one of the amino acid sequences of SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394. The preferred polypeptide of the present invention preferably possesses at least one of the activities according to the invention and described herein. A preferred polypeptide of the present invention includes an amino acid sequence encoded by a nucleotide sequence which hybridizes, preferably hybridizes under stringent conditions, to a nucleotide sequence of SEQ ID NO: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, 43, 45, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83, 85, 87, 89, 91, 93, 95, 97, 99, 101, 103, 105, 107, 109, 111, 113, 115, 117, 119, 121, 123, 125, 127, 129, 131, 133, 135, 137, 139, 141, 143, 145, 147, 149, 151, 153, 155, 157, 159, 161, 163, 165, 167, 169, 171, 173, 175, 177, 179, 181, 183, 185, 187, 189, 191, 193, 195, 197, 199, 201, 203, 205, 207, 209, 211, 213, 215, 217, 219, 221, 223, 225, 227, 229, 231, 233, 235, 237, 239, 241, 243, 245, 247, 249, 251, 253, 255, 257, 259, 261, 263, 265, 267, 269, 271, 273, 275, 277, 279, 281, 283, 285, 287, 289,

291, 293, 295, 297, 299, 301, 303, 305, 307, 309, 311, 313, 315, 317, 319, 321, 323, 325, 327, 329, 331, 333, 335, 337, 339, 341, 343, 345, 347, 349, 351, 353, 355, 357, 359, 361, 363, 365, 367, 369, 371, 373, 375, 377, 379, 381, 383, 385, 387, 389, 391 or 393 or which is homologous thereto, as defined above.

5 **[0314.0.0.0]** Accordingly the polypeptide of the present invention can vary from SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 10 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 15 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394 in amino acid sequence due to natural variation or mutagenesis, as described in detail herein. Accordingly, the polypeptide comprise an amino acid sequence which is at least about 35%, 40%, 45%, 50%, 55%, 60%, 65% or 70%, preferably at least about 75%, 80%, 85% or 90, and 20 more preferably at least about 91%, 92%, 93%, 94% or 95%, and most preferably at least about 96%, 97%, 98%, 99% or more homologous to an entire amino acid sequence of SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 25 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 30 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394.

[0315.0.0.0] For the comparison of amino acid sequences the same algorithms as described above or nucleic acid sequences can be used. Results of high quality are 35 reached by using the algorithm of Needleman and Wunsch or Smith and Waterman. Therefore programs based on said algorithms are preferred. Advantageously the comparisons of sequences can be done with the program PileUp (J. Mol. Evolution., 25, 351-360, 1987, Higgins et al., CABIOS, 5 1989: 151-153) or preferably with the programs Gap and BestFit, which are respectively based on the algorithms of 40 Needleman and Wunsch [J. Mol. Biol. 48; 443-453 (1970)] and Smith and Waterman [Adv. Appl. Math. 2; 482-489 (1981)]. Both programs are part of the GCG software-

package [Genetics Computer Group, 575 Science Drive, Madison, Wisconsin, USA 53711 (1991); Altschul et al. (1997) Nucleic Acids Res. 25:3389 et seq.]. Therefore preferably the calculations to determine the percentages of sequence homology are done with the program Gap over the whole range of the sequences. The following
5 standard adjustments for the comparison of amino acid sequences were used: gap weight: 8, length weight: 2, average match: 2.912, average mismatch: -2.003.

[0316.0.0.0] Biologically active portions of an polypeptide of the present invention include peptides comprising amino acid sequences derived from the amino acid sequence of the polypeptide of the present invention or used in the process of the
10 present invention, e.g., the amino acid sequence shown in SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174,
15 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344,
20 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394 or the amino acid sequence of a protein homologous thereto, which include fewer amino acids than a full length polypeptide of the present invention or used in the process of the present invention or the full length protein which is homologous to an polypeptide of the present invention or used in the
25 process of the present invention depicted herein, and exhibit at least one activity of polypeptide of the present invention or used in the process of the present invention .

[0317.0.0.0] Typically, biologically (or immunologically) active portions i.e. peptides, e.g., peptides which are, for example, 5, 10, 15, 20, 30, 35, 36, 37, 38; 39, 40, 50, 100 or more amino acids in length comprise a domain or motif with at least one activity or
30 epitope of a polypeptide of the present invention or used in the process of the present invention. Moreover, other biologically active portions, in which other regions of the polypeptide are deleted, can be prepared by recombinant techniques and evaluated for one or more of the activities described herein.

[0318.0.0.0] Manipulation of the nucleic acid molecule of the invention may result in
35 the production of proteins having the biological activity represented by a protein as depicted in SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160,
40 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194,

196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 5 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394 and having differences from said aforementioned wild-type proteins. These proteins may be improved in efficiency or activity, may be present in greater numbers in the cell than is usual, or may be decreased in efficiency or activity in relation to the wild type protein.

10 **[0319.0.0.0]** Any mutagenesis strategies for the polypeptide of the present invention or the polypeptide used in the process of the present invention to result in increasing said activity are not meant to be limiting; variations on these strategies will be readily apparent to one skilled in the art. Using such strategies, and incorporating the mechanisms disclosed herein, the nucleic acid molecule and polypeptide of the
15 invention may be utilized to generate plants or parts thereof, expressing wildtype proteins of the invention or mutated protein encoding nucleic acid molecules and polypeptide molecules of the invention such that the yield, production, and/or efficiency of production of a desired compound is improved.

20 **[0320.0.0.0]** This desired compound may be any natural product of plants, which includes the final products of biosynthesis pathways and intermediates of naturally-occurring metabolic pathways, as well as molecules which do not naturally occur in the metabolism of said cells, but which are produced by a said cells of the invention. Preferably, the compound is a composition of amino acids or a recovered amino acid, in particular, the fine chemical, free or in protein-bound form.

25 **[0321.0.0.0]** The invention also provides chimeric or fusion proteins.

[0322.0.0.0] As used herein, an "chimeric protein" or "fusion protein" comprises an polypeptide operatively linked to a polypeptide which does not confer above-mentioned activity, in particulare, which does not confer an increase of content of the fine chemical in a cell or an organism or a part thereof, if its activity is increased.

30 **[0323.0.0.0]** In one embodiment, a protein (= polypeptide)" having the biological activity represented by a protein as depicted in SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146,
35 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282,

284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394 refers to a polypeptide having an amino acid sequence corresponding to the polypeptide of the invention or used in the process of the invention, whereas a "non- polypeptide of the invention" or "other polypeptide" refers to a polypeptide having an amino acid sequence corresponding to a protein which is not substantially homologous a polypeptide of the invention, preferably which is not substantially homologous to a polypeptide having the biological activity represented by a protein as depicted in SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394, e.g., a protein which does not confer the activity described herein and which is derived from the same or a different organism.

[0324.0.0.0] Within the fusion protein, the term "operatively linked" is intended to indicate that the polypeptide of the invention or a polypeptide used in the process of the invention and the "other polypeptide" or a part thereof are fused to each other so that both sequences fulfil the proposed function addicted to the sequence used. The "other polypeptide" can be fused to the N-terminus or C-terminus of the polypeptide of the invention or used in the process of the invention. For example, in one embodiment the fusion protein is a GST-LMRP fusion protein in which the sequences of the polypeptide of the invention or the polypeptide used in the process of the invention are fused to the C-terminus of the GST sequences. Such fusion proteins can facilitate the purification of recombinant polypeptides of the invention or a polypeptide useful in the process of the invention.

[0325.0.0.0] In another embodiment, the fusion protein is a polypeptide of the invention or a polypeptide used in the process of the invention containing a heterologous signal sequence at its N-terminus. In certain host cells (e.g., mammalian host cells), expression and/or secretion of a polypeptide of the invention or a polypeptide used in the process of the invention can be increased through use of a heterologous signal sequence. As already mentioned above, targeting sequences, are required for targeting the gene product into specific cell compartment (for a review, see Kermode, Crit. Rev. Plant Sci. 15, 4 (1996) 285-423 and references cited therein), for

example into the vacuole, the nucleus, all types of plastids, such as amyloplasts, chloroplasts, chromoplasts, the extracellular space, the mitochondria, the endoplasmic reticulum, elaioplasts, peroxisomes, glycosomes, and other compartments of cells or extracellular. Sequences, which must be mentioned in this context are, in particular, the
5 signal-peptide- or transit-peptide-encoding sequences which are known per se. For example, plastid-transit-peptide-encoding sequences enable the targeting of the expression product into the plastids of a plant cell. Targeting sequences are also known for eukaryotic and to a lower extent for prokaryotic organisms and can advantageously be operable linked with the nucleic acid molecule of the present
10 invention to achieve an expression in one of said compartments or extracellular.

[0326.0.0.0] Preferably, a chimeric or fusion protein of the invention is produced by standard recombinant DNA techniques. For example, DNA fragments coding for the different polypeptide sequences are ligated together in-frame in accordance with conventional techniques, for example by employing blunt-ended or stagger-ended
15 termini for ligation, restriction enzyme digestion to provide for appropriate termini, filling-in of cohesive ends as appropriate, alkaline phosphatase treatment to avoid undesirable joining, and enzymatic ligation. The fusion gene can be synthesized by conventional techniques including automated DNA synthesizers. Alternatively, PCR amplification of gene fragments can be carried out using anchor primers, which give
20 rise to complementary overhangs between two consecutive gene fragments which can subsequently be annealed and reamplified to generate a chimeric gene sequence (see, for example, *Current Protocols in Molecular Biology*, eds. Ausubel et al. John Wiley & Sons: 1992). Moreover, many expression vectors are commercially available that already encode a fusion moiety (e.g., a GST polypeptide). The nucleic acid molecule
25 of the invention can be cloned into such an expression vector such that the fusion moiety is linked in-frame to the encoded protein.

[0327.0.0.0] Furthermore, folding simulations and computer redesign of structural motifs of the protein of the invention can be performed using appropriate computer programs (Olszewski, *Proteins* 25 (1996), 286-299; Hoffman, *Comput. Appl. Biosci.* 11
30 (1995), 675-679). Computer modeling of protein folding can be used for the conformational and energetic analysis of detailed peptide and protein models (Monge, *J. Mol. Biol.* 247 (1995), 995-1012; Renouf, *Adv. Exp. Med. Biol.* 376 (1995), 37-45). The appropriate programs can be used for the identification of interactive sites the polypeptide of the invention or polypeptides used in the process of the invention and its
35 substrates or binding factors or other interacting proteins by computer assistant searches for complementary peptide sequences (Fassina, *Immunomethods* (1994), 114-120). Further appropriate computer systems for the design of protein and peptides are described in the prior art, for example in Berry, *Biochem. Soc. Trans.* 22 (1994), 1033-1036; Wodak, *Ann. N. Y. Acad. Sci.* 501 (1987), 1-13; Pabo, *Biochemistry* 25
40 (1986), 5987-5991. The results obtained from the above-described computer analysis can be used for, e.g., the preparation of peptidomimetics of the protein of the invention

or fragments thereof. Such pseudopeptide analogues of the, natural amino acid sequence of the protein may very efficiently mimic the parent protein (Benkirane, J. Biol. Chem. 271 (1996), 33218-33224). For example, incorporation of easily available achiral Q-amino acid residues into a protein of the invention or a fragment thereof results in the substitution of amide bonds by polymethylene units of an aliphatic chain, thereby providing a convenient strategy for constructing a peptidomimetic (Banerjee, Biopolymers 39 (1996), 769-777).

[0328.0.0.0] Superactive peptidomimetic analogues of small peptide hormones in other systems are described in the prior art (Zhang, Biochem. Biophys. Res. Commun. 224 (1996), 327-331). Appropriate peptidomimetics of the protein of the present invention can also be identified by the synthesis of peptidomimetic combinatorial libraries through successive amide alkylation and testing the resulting compounds, e.g., for their binding and immunological properties. Methods for the generation and use of peptidomimetic combinatorial libraries are described in the prior art, for example in Ostresh, Methods in Enzymology 267 (1996), 220-234 and Dorner, Bioorg. Med. Chem. 4 (1996), 709-715.

[0329.0.0.0] Furthermore, a three-dimensional and/or crystallographic structure of the protein of the invention can be used for the design of peptidomimetic inhibitors of the biological activity of the protein of the invention (Rose, Biochemistry 35 (1996), 12933-12944; Rutenber, Bioorg. Med. Chem. 4 (1996), 1545-1558).

[0330.0.0.0] Furthermore, a three-dimensional and/or crystallographic structure of the protein of the invention and the identification of interactive sites the polypeptide of the invention and its substrates or binding factors can be used for design of mutants with modulated binding or turn over activities. For example, the active center of the polypeptide of the present invention can be modelled and amino acid residues participating in the catalytic reaction can be modulated to increase or decrease the binding of the substrate to activate or improve the polypeptide. The identification of the active center and the amino acids involved in the catalytic reaction facilitates the screening for mutants having an increased activity.

[0331.0.0.0] One embodiment of the invention also relates to an antibody, which binds specifically to the polypeptide according to the invention or parts, i.e. specific fragments or epitopes of such a protein.

[0332.0.0.0] The antibodies of the invention can be used to identify and isolate the polypeptide according to the invention and encoding genes in any organism, preferably plants, prepared in plants described herein. These antibodies can be monoclonal antibodies, polyclonal antibodies or synthetic antibodies as well as fragments of antibodies, such as Fab, Fv or scFv fragments etc. Monoclonal antibodies can be prepared, for example, by the techniques as originally described in Köhler and Milstein,

Nature 256 (1975), 495, and Galfr6, Meth. Enzymol. 73 (1981), 3, which comprise the fusion of mouse myeloma cells to spleen cells derived from immunized mammals.

5 [0333.0.0.0] Furthermore, antibodies or fragments thereof to the aforementioned peptides can be obtained by using methods, which are described, e.g., in Harlow and Lane "Antibodies, A Laboratory Manual", CSH Press, Cold Spring Harbor, 1988. These antibodies can be used, for example, for the immunoprecipitation and immunolocalization of proteins according to the invention as well as for the monitoring of the synthesis of such proteins, for example, in recombinant organisms, and for the identification of compounds interacting with the protein according to the invention. For example, surface plasmon resonance as employed in the BIAcore system can be used to increase the efficiency of phage antibodies selections, yielding a high increment of affinity from a single library of phage antibodies, which bind to an epitope of the protein of the invention (Schier, Human Antibodies Hybridomas 7 (1996), 97-105; Malmberg, J. Immunol. Methods 183 (1995), 7-13). In many cases, the binding phenomena of antibodies to antigens are equivalent to other ligand/anti-ligand binding.

[0334.0.0.0] In one embodiment, the present invention relates to an antisense nucleic acid molecule comprising the complementary sequence of the nucleic acid molecule of the present invention.

20 [0335.0.0.0] Methods to modify the expression levels and/or the activity are known to persons skilled in the art and include for instance overexpression, co-suppression, the use of ribozymes, sense and anti-sense strategies or other gene silencing approaches like RNA interference (RNAi) or promoter methylation. "Sense strand" refers to the strand of a double-stranded DNA molecule that is homologous to an mRNA transcript thereof. The "anti-sense strand" contains an inverted sequence, which is complementary to that of the "sense strand".

25 In addition the expression levels and/or the activity can be modified by the introduction of mutations in the regulatory or coding regions of the nucleic acids of the invention. Furthermore antibodies can be expressed which specifically binds to a polypeptide of interest and thereby blocks its activity. The protein-binding factors can, for example, also be aptamers [Famulok M and Mayer G (1999) Curr. Top Microbiol. Immunol. 243: 123-36] or antibodies or antibody fragments or single-chain antibodies. Obtaining these factors has been described, and the skilled worker is familiar therewith. For example, a cytoplasmic scFv antibody has been employed for modulating activity of the phytochrome A protein in genetically modified tobacco plants [Owen M et al. (1992) Biotechnology (NY) 10(7): 790-794; Franken E et al. (1997) Curr. Opin. Biotechnol. 8(4): 411-416; Whitelam (1996) Trend Plant Sci. 1: 286-272].

35 [0336.0.0.0] An "antisense" nucleic acid molecule comprises a nucleotide sequence, which is complementary to a "sense" nucleic acid molecule encoding a protein, e.g., complementary to the coding strand of a double-stranded cDNA molecule or

complementary to an encoding mRNA sequence. Accordingly, an antisense nucleic acid molecule can bond via hydrogen bonds to a sense nucleic acid molecule. The antisense nucleic acid molecule can be complementary to an entire coding strand of a nucleic acid molecule conferring the expression of the polypeptide of the invention or
5 used in the process of the present invention, as the nucleic acid molecule of the invention coding strand, or to only a portion thereof. Accordingly, an antisense nucleic acid molecule can be antisense to a "coding region" of the coding strand of a nucleotide sequence of a nucleic acid molecule of the present invention. The term "coding region" refers to the region of the nucleotide sequence comprising codons,
10 which are translated into amino acid residues. Further, the antisense nucleic acid molecule is antisense to a "noncoding region" of the coding strand of a nucleotide sequence encoding the polypeptide of the invention or a polypeptide used in the process of the invention. The term "noncoding region" refers to 5' and 3' sequences which flank the coding region that are not translated into a polypeptide, i.e., also
15 referred to as 5' and 3' untranslated regions (5'-UTR or 3'-UTR).

[0337.0.0.0] Given the coding strand sequences encoding the polypeptide of the present invention antisense nucleic acid molecules of the invention can be designed according to the rules of Watson and Crick base pairing.

[0338.0.0.0] The antisense nucleic acid molecule can be complementary to the entire
20 coding region of the mRNA encoding the nucleic acid molecule of the invention or used in the process of the present invention, but can also be an oligonucleotide which is antisense to only a portion of the coding or noncoding region of said mRNA. For example, the antisense oligonucleotide can be complementary to the region surrounding the translation start site of said mRNA. An antisense oligonucleotide can
25 be, for example, about 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 100 or 200 nucleotides in length. An antisense nucleic acid molecule of the invention can be constructed using chemical synthesis and enzymatic ligation reactions using procedures known in the art. For example, an antisense nucleic acid molecule (e.g., an antisense oligonucleotide) can be chemically synthesized using naturally occurring nucleotides or variously
30 modified nucleotides designed to increase the biological stability of the molecules or to increase the physical stability of the duplex formed between the antisense and sense nucleic acids, e.g., phosphorothioate derivatives and acridine substituted nucleotides can be used. Examples of modified nucleotides which can be used to generate the antisense nucleic acid include 5-fluorouracil, 5-bromouracil, 5-chlorouracil, 5-iodouracil,
35 hypoxanthine, xanthine, 4-acetylcytosine, 5-(carboxyhydroxymethyl) uracil, 5-carboxymethylaminomethyl-2-thiouridine, 5-carboxymethylaminomethyluracil, dihydrouracil, beta-D-galactosylqueosine, inosine, N6-isopentenyladenine, 1-methylguanine, 1-methylinosine, 2,2-dimethylguanine, 2-methyladenine, 2-methylguanine, 3-methylcytosine, 5-methylcytosine, N6-adenine, 7-methylguanine, 5-methylaminomethyluracil, 5-methoxycarboxymethyl-2-thiouracil, beta-D-mannosylqueosine, 5'-methoxycarboxymethyluracil, 5-methoxyuracil, 2-methylthio-N6-

- isopentenyladenine, uracil-5-oxyacetic acid (v), wybutoxosine, pseudouracil, queosine, 2-thiocytosine, 5-methyl-2-thiouracil, 2-thiouracil, 4-thiouracil, 5-methyluracil, uracil-5-oxyacetic acid methylester, uracil-5-oxyacetic acid (v), 5-methyl-2-thiouracil, 3-(3-amino-3-N-2-carboxypropyl) uracil, (acp3)w, and 2,6-diaminopurine. Alternatively, the antisense nucleic acid can be produced biologically using an expression vector into which a nucleic acid molecule has been subcloned in an antisense orientation (i.e., RNA transcribed from the inserted nucleic acid molecule will be of an antisense orientation to a target nucleic acid molecule of interest, described further in the following subsection).
- 10 **[0339.0.0.0]** The antisense nucleic acid molecules of the invention are typically administered to a cell or generated *in situ* such that they hybridize with or bind to cellular mRNA and/or genomic DNA encoding a polypeptide of the invention having aforementioned the fine chemical increasing activity to thereby inhibit expression of the protein, e.g., by inhibiting transcription and/or translation.
- 15 **[0340.0.0.0]** The hybridization can be by conventional nucleotide complementarity to form a stable duplex, or, for example, in the case of an antisense nucleic acid molecule which binds to DNA duplexes, through specific interactions in the major groove of the double helix. The antisense nucleic acid molecule can also be delivered to cells using the vectors described herein. To achieve sufficient intracellular concentrations of the antisense molecules, vector in which the antisense nucleic acid molecule is placed under the control of a strong prokaryotic, viral, or eukaryotic including plant promoters are preferred.
- 20 **[0341.0.0.0]** In a further embodiment, the antisense nucleic acid molecule of the invention can be an α -anomeric nucleic acid molecule. A α -anomeric nucleic acid molecule forms specific double-stranded hybrids with complementary RNA in which, contrary to the usual units, the strands run parallel to each other (Gaultier et al. (1987) *Nucleic Acids Res.* 15:6625-6641). The antisense nucleic acid molecule can also comprise a 2'-o-methylribonucleotide (Inoue et al. (1987) *Nucleic Acids Res.* 15:6131-6148) or a chimeric RNA-DNA analogue (Inoue et al. (1987) *FEBS Lett.* 215:327-330).
- 30 **[0342.0.0.0]** Further the antisense nucleic acid molecule of the invention can be also a ribozyme. Ribozymes are catalytic RNA molecules with ribonuclease activity, which are capable of cleaving a single-stranded nucleic acid, such as an mRNA, to which they have a complementary region. Thus, ribozymes (e.g., hammerhead ribozymes (described in Haselhoff and Gerlach (1988) *Nature* 334:585-591)) can be used to catalytically cleave mRNA transcripts encoding the polypeptide of the invention to thereby inhibit translation of said mRNA. A ribozyme having specificity for a nucleic acid molecule encoding the polypeptide of the invention or used in the process of the invention can be designed based upon the nucleotide sequence of the nucleic acid molecule of the invention or coding a protein used in the process of the invention or on
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the basis of a heterologous sequence to be isolated according to methods taught in this invention. For example, a derivative of a *Tetrahymena* L-19 IVS RNA can be constructed in which the nucleotide sequence of the active site is complementary to the nucleotide sequence to be cleaved in an encoding mRNA. See, e.g., Cech et al. U.S. Patent No. 4,987,071 and Cech et al. U.S. Patent No. 5,116,742. Alternatively, mRNA encoding the polypeptide of the invention or a polypeptide used in the process of the invention can be used to select a catalytic RNA having a specific ribonuclease activity from a pool of RNA molecules. See, e.g., Bartel, D. and Szostak, J.W. (1993) *Science* 261:1411-1418.

- 5 [0343.0.0.0] The antisense molecule of the present invention comprises also a nucleic acid molecule comprising a nucleotide sequences complementary to the regulatory region of an nucleotide sequence encoding the natural occurring polypeptide of the invention, e.g. the polypeptide sequences shown in the sequence listing, or identified according to the methods described herein, e.g., its promoter and/or enhancers, e.g. to form triple helical structures that prevent transcription of the gene in target cells. See generally, Helene, C. (1991) *Anticancer Drug Des.* 6(6): 569-84; Helene, C. et al. (1992) *Ann. N.Y. Acad. Sci.* 660:27-36; and Maher, L.J. (1992) *Bioassays* 14(12):807-15.

- 20 [0344.0.0.0] Furthermore the present invention relates to a double stranded RNA molecule capable for the reduction or inhibition of the activity of the gene product of a gene encoding the polypeptide of the invention, a polypeptide used in the process of the invention, the nucleic acid molecule of the invention or a nucleic acid molecule used in the process of the invention encoding.

- 25 [0345.0.0.0] The method of regulating genes by means of double-stranded RNA ("double-stranded RNA interference"; dsRNAi) has been described extensively for animal, yeast, fungi and plant organisms such as *Neurospora*, zebrafish, *Drosophila*, mice, planaria, humans, *Trypanosoma*, petunia or *Arabidopsis* (for example Matzke MA et al. (2000) *Plant Mol. Biol.* 43: 401-415; Fire A. et al. (1998) *Nature* 391: 806-811; WO 99/32619; WO 99/53050; WO 00/68374; WO 00/44914; WO 00/44895; WO 30 00/49035; WO 00/63364). In addition RNAi is also documented as an advantageously tool for the repression of genes in bacteria such as *E. coli* for example by Tchurikov et al. [*J. Biol. Chem.*, 2000, 275 (34): 26523 - 26529]. Fire et al. named the phenomenon RNAi for "RNA interference". The techniques and methods described in the above references are expressly referred to. Efficient gene suppression can also be observed 35 in the case of transient expression or following transient transformation, for example as the consequence of a biolistic transformation (Schweizer P et al. (2000) *Plant J* 2000 24: 895-903). dsRNAi methods are based on the phenomenon that the simultaneous introduction of complementary strand and counterstrand of a gene transcript brings about highly effective suppression of the expression of the gene in question. The

resulting phenotype is very similar to that of an analogous knock-out mutant (Waterhouse PM et al. (1998) Proc. Natl. Acad. Sci. USA 95: 13959-64).

[0346.0.0.0] Tuschl et al. [Gens Dev., 1999, 13 (24): 3191 – 3197] was able to show that the efficiency of the RNAi method is a function of the length of the duplex, the length of the 3'-end overhangs, and the sequence in these overhangs. Based on the work of Tuschl et al. the following guidelines can be given to the skilled worker: To achieve good results the 5' and 3' untranslated regions of the used nucleic acid sequence and regions close to the start codon should be avoided as this regions are richer in regulatory protein binding sites and interactions between RNAi sequences and such regulatory proteins might lead to undesired interactions. Preferably a region of the used mRNA is selected, which is 50 to 100 nt (= nucleotides or bases) downstream of the AUG start codon. Only dsRNA (= double-stranded RNA) sequences from exons are useful for the method, as sequences from introns have no effect. The G/C content in this region should be greater than 30% and less than 70% ideally around 50%. A possible secondary structure of the target mRNA is less important for the effect of the RNAi method.

[0347.0.0.0] The dsRNAi method has proved to be particularly effective and advantageous for reducing the expression of the nucleic acid sequences of the SEQ ID NO: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41 43, 45, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83, 85, 87, 89, 91, 93, 95, 97, 99, 101, 103, 105, 107, 109, 111, 113, 115, 117, 119, 121, 123, 125, 127, 129, 131, 133, 135, 137, 139, 141, 143, 145, 147, 149, 151, 153, 155, 157, 159, 161, 163, 165, 167, 169, 171, 173, 175, 177, 179, 181, 183, 185, 187, 189, 191, 193, 195, 197, 199, 201, 203, 205, 207, 209, 211, 213, 215, 217, 219, 221, 223, 225, 227, 229, 231, 233, 235, 237, 239, 241, 243, 245, 247, 249, 251, 253, 255, 257, 259, 261, 263, 265, 267, 269, 271, 273, 275, 277, 279, 281, 283, 285, 287, 289, 291, 293, 295, 297, 299, 301, 303, 305, 307, 309, 311, 313, 315, 317, 319, 321, 323, 325, 327, 329, 331, 333, 335, 337, 339, 341, 343, 345, 347, 349, 351, 353, 355, 357, 359, 361, 363, 365, 367, 369, 371, 373, 375, 377, 379, 381, 383, 385, 387, 389, 391 or 393 and/or homologs thereof. As described inter alia in WO 99/32619, dsRNAi approaches are clearly superior to traditional antisense approaches. The invention therefore furthermore relates to double-stranded RNA molecules (dsRNA molecules) which, when introduced into an organism, advantageously into a plant (or a cell, tissue, organ or seed derived therefrom), bring about altered metabolic activity by the reduction in the expression of the nucleic acid sequences of the SEQ ID NO: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41 43, 45, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83, 85, 87, 89, 91, 93, 95, 97, 99, 101, 103, 105, 107, 109, 111, 113, 115, 117, 119, 121, 123, 125, 127, 129, 131, 133, 135, 137, 139, 141, 143, 145, 147, 149, 151, 153, 155, 157, 159, 161, 163, 165, 167, 169, 171, 173, 175, 177, 179, 181, 183, 185, 187, 189, 191, 193, 195, 197, 199, 201, 203, 205, 207, 209, 211, 213, 215, 217, 219, 221, 223, 225, 227, 229, 231, 233, 235, 237, 239, 241, 243, 245, 247, 249, 251, 253,

255, 257, 259, 261, 263, 265, 267, 269, 271, 273, 275, 277, 279, 281, 283, 285, 287, 289, 291, 293, 295, 297, 299, 301, 303, 305, 307, 309, 311, 313, 315, 317, 319, 321, 323, 325, 327, 329, 331, 333, 335, 337, 339, 341, 343, 345, 347, 349, 351, 353, 355, 357, 359, 361, 363, 365, 367, 369, 371, 373, 375, 377, 379, 381, 383, 385, 387, 389, 391 or 393 and/or homologs thereof. In a double-stranded RNA molecule for reducing the expression of an protein encoded by a nucleic acid sequence of one of the SEQ ID NO: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, 43, 45, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83, 85, 87, 89, 91, 93, 95, 97, 99, 101, 103, 105, 107, 109, 111, 113, 115, 117, 119, 121, 123, 125, 127, 129, 131, 133, 135, 137, 139, 141, 143, 145, 147, 149, 151, 153, 155, 157, 159, 161, 163, 165, 167, 169, 171, 173, 175, 177, 179, 181, 183, 185, 187, 189, 191, 193, 195, 197, 199, 201, 203, 205, 207, 209, 211, 213, 215, 217, 219, 221, 223, 225, 227, 229, 231, 233, 235, 237, 239, 241, 243, 245, 247, 249, 251, 253, 255, 257, 259, 261, 263, 265, 267, 269, 271, 273, 275, 277, 279, 281, 283, 285, 287, 289, 291, 293, 295, 297, 299, 301, 303, 305, 307, 309, 311, 313, 315, 317, 319, 321, 323, 325, 327, 329, 331, 333, 335, 337, 339, 341, 343, 345, 347, 349, 351, 353, 355, 357, 359, 361, 363, 365, 367, 369, 371, 373, 375, 377, 379, 381, 383, 385, 387, 389, 391 or 393 and/or homologs thereof, one of the two RNA strands is essentially identical to at least part of a nucleic acid sequence, and the respective other RNA strand is essentially identical to at least part of the complementary strand of a nucleic acid sequence.

[0348.0.0.0] The term "essentially identical" refers to the fact that the dsRNA sequence may also include insertions, deletions and individual point mutations in comparison to the target sequence while still bringing about an effective reduction in expression. Preferably, the homology as defined above amounts to at least 30%, preferably at least 40%, 50%, 60%, 70% or 80%, very especially preferably at least 90%, most preferably 100%, between the "sense" strand of an inhibitory dsRNA and a part-segment of a nucleic acid sequence of the invention (or between the "antisense" strand and the complementary strand of a nucleic acid sequence, respectively). The part-segment amounts to at least 10 bases, preferably at least 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29 or 30 bases, especially preferably at least 40, 50, 60, 70, 80 or 90 bases, very especially preferably at least 100, 200, 300 or 400 bases, most preferably at least 500, 600, 700, 800, 900 or more bases or at least 1000 or 2000 bases or more in length. In another preferred embodiment of the invention the part-segment amounts to 17, 18, 19, 20, 21, 22, 23, 24, 25, 26 or 27 bases, preferably to 20, 21, 22, 23, 24 or 25 bases. These short sequences are preferred in animals and plants. The longer sequences preferably between 200 and 800 bases are preferred in nonmammalian animals, preferably in invertebrates, in yeast, fungi or bacteria, but they are also useable in plants. Long double-stranded RNAs are processed in the organisms into many siRNAs (= small/short interfering RNAs) for example by the protein Dicer, which is a ds-specific RNase III enzyme. As an alternative, an "essentially identical" dsRNA may also be defined as a nucleic acid sequence, which is capable of

hybridizing with part of a gene transcript (for example in 400 mM NaCl, 40 mM PIPES pH 6.4, 1 mM EDTA at 50°C or 70°C for 12 to 16 h).

5 **[0349.0.0.0]** The dsRNA may consist of one or more strands of polymerized ribonucleotides. Modification of both the sugar-phosphate backbone and of the nucleosides may furthermore be present. For example, the phosphodiester bonds of the natural RNA can be modified in such a way that they encompass at least one nitrogen or sulfur heteroatom. Bases may undergo modification in such a way that the activity of, for example, adenosine deaminase is restricted. These and other modifications are described herein below in the methods for stabilizing antisense RNA.

10 **[0350.0.0.0]** The dsRNA can be prepared enzymatically; it may also be synthesized chemically, either in full or in part.

15 **[0351.0.0.0]** The double-stranded structure can be formed starting from a single, self-complementary strand or starting from two complementary strands. In a single, self-complementary strand, "sense" and "antisense" sequence can be linked by a linking sequence ("linker") and form for example a hairpin structure. Preferably, the linking sequence may take the form of an intron, which is spliced out following dsRNA synthesis. The nucleic acid sequence encoding a dsRNA may contain further elements such as, for example, transcription termination signals or polyadenylation signals. If the two strands of the dsRNA are to be combined in a cell or an organism advantageously
20 in a plant, this can be brought about in a variety of ways.

[0352.0.0.0] Formation of the RNA duplex can be initiated either outside the cell or within the cell. As shown in WO 99/53050, the dsRNA may also encompass a hairpin structure, by linking the "sense" and "antisense" strands by a "linker" (for example an intron). The self-complementary dsRNA structures are preferred since they merely
25 require the expression of a construct and always encompass the complementary strands in an equimolar ratio.

[0353.0.0.0] The expression cassettes encoding the "antisense" or the "sense" strand of the dsRNA or the self-complementary strand of the dsRNA are preferably inserted into a vector and stably inserted into the genome of a plant, using the methods
30 described herein below (for example using selection markers), in order to ensure permanent expression of the dsRNA.

[0354.0.0.0] The dsRNA can be introduced using an amount which makes possible at least one copy per cell. A larger amount (for example at least 5, 10, 100, 500 or 1 000 copies per cell) may bring about more efficient reduction.

35 **[0355.0.0.0]** As has already been described, 100 % sequence identity between the dsRNA and a gene transcript of a nucleic acid sequence of one of the SEQ ID NO: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41 43, 45, 55, 57,

59, 61, 63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83, 85, 87, 89, 91, 93, 95, 97, 99, 101, 103, 105, 107, 109, 111, 113, 115, 117, 119, 121, 123, 125, 127, 129, 131, 133, 135, 137, 139, 141, 143, 145, 147, 149, 151, 153, 155, 157, 159, 161, 163, 165, 167, 169, 171, 173, 175, 177, 179, 181, 183, 185, 187, 189, 191, 193, 195, 197, 199, 201, 203, 205, 207, 209, 211, 213, 215, 217, 219, 221, 223, 225, 227, 229, 231, 233, 235, 237, 239, 241, 243, 245, 247, 249, 251, 253, 255, 257, 259, 261, 263, 265, 267, 269, 271, 273, 275, 277, 279, 281, 283, 285, 287, 289, 291, 293, 295, 297, 299, 301, 303, 305, 307, 309, 311, 313, 315, 317, 319, 321, 323, 325, 327, 329, 331, 333, 335, 337, 339, 341, 343, 345, 347, 349, 351, 353, 355, 357, 359, 361, 363, 365, 367, 369, 371, 373, 375, 377, 379, 381, 383, 385, 387, 389, 391 or 393 or it's homolog is not necessarily required in order to bring about effective reduction in the expression. The advantage is, accordingly, that the method is tolerant with regard to sequence deviations as may be present as a consequence of genetic mutations, polymorphisms or evolutionary divergences. Thus, for example, using the dsRNA, which has been generated starting from a sequence of one of SEQ ID NO: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, 43, 45, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83, 85, 87, 89, 91, 93, 95, 97, 99, 101, 103, 105, 107, 109, 111, 113, 115, 117, 119, 121, 123, 125, 127, 129, 131, 133, 135, 137, 139, 141, 143, 145, 147, 149, 151, 153, 155, 157, 159, 161, 163, 165, 167, 169, 171, 173, 175, 177, 179, 181, 183, 185, 187, 189, 191, 193, 195, 197, 199, 201, 203, 205, 207, 209, 211, 213, 215, 217, 219, 221, 223, 225, 227, 229, 231, 233, 235, 237, 239, 241, 243, 245, 247, 249, 251, 253, 255, 257, 259, 261, 263, 265, 267, 269, 271, 273, 275, 277, 279, 281, 283, 285, 287, 289, 291, 293, 295, 297, 299, 301, 303, 305, 307, 309, 311, 313, 315, 317, 319, 321, 323, 325, 327, 329, 331, 333, 335, 337, 339, 341, 343, 345, 347, 349, 351, 353, 355, 357, 359, 361, 363, 365, 367, 369, 371, 373, 375, 377, 379, 381, 383, 385, 387, 389, 391 or 393 or homologs thereof of the one organism, may be used to suppress the corresponding expression in another organism.

[0356.0.0.0] Due to the high degree of sequence homology between sequences from various organisms (e. g. plants), allows the conclusion that these proteins may be conserved to a high degree within, for example other, plants, it is optionally possible that the expression of a dsRNA derived from one of the disclosed sequences as shown herein or homologs thereof should also have has an advantageous effect in other plant species. Preferably the consensus sequences shown herein can be used for the construction of useful dsRNA molecules.

[0357.0.0.0] The dsRNA can be synthesized either in vivo or in vitro. To this end, a DNA sequence encoding a dsRNA can be introduced into an expression cassette under the control of at least one genetic control element (such as, for example, promoter, enhancer, silencer, splice donor or splice acceptor or polyadenylation signal). Suitable advantageous constructs are described herein below. Polyadenylation is not required, nor do elements for initiating translation have to be present.

[0358.0.0.0] A dsRNA can be synthesized chemically or enzymatically. Cellular RNA polymerases or bacteriophage RNA polymerases (such as, for example T3, T7 or SP6 RNA polymerase) can be used for this purpose. Suitable methods for the in-vitro expression of RNA are described (WO 97/32016; US 5,593,874; US 5,698,425, 5 US 5,712,135, US 5,789,214, US 5,804,693). Prior to introduction into a cell, tissue or organism, a dsRNA which has been synthesized in vitro either chemically or enzymatically can be isolated to a higher or lesser degree from the reaction mixture, for example by extraction, precipitation, electrophoresis, chromatography or combinations of these methods. The dsRNA can be introduced directly into the cell or else be applied 10 extracellularly (for example into the interstitial space).

[0359.0.0.0] Advantageously the RNAi method leads to only a partial loss of gene function and therefore enables the skilled worker to study a gene dose effect in the disordered organism and to fine tune the process of the invention. Furthermore it enables a person skilled in the art to study multiple functions of a gene.

15 **[0360.0.0.0]** Stable transformation of the plant with an expression construct, which brings about the expression of the dsRNA is preferred, however. Suitable methods are described herein below.

[0361.0.0.0] A further embodiment of the invention also relates to a method for the generation of a transgenic host or host cell, e.g. a eukaryotic or prokaryotic cell, 20 preferably a transgenic microorganism, a transgenic plant cell or a transgenic plant tissue or a transgenic plant, which comprises introducing, into the plant, the plant cell or the plant tissue, the nucleic acid construct according to the invention, the vector according to the invention, or the nucleic acid molecule according to the invention.

[0362.0.0.0] A further embodiment of the invention also relates to a method for the 25 transient generation of a host or host cell, eukaryotic or prokaryotic cell, preferably a transgenic microorganism, a transgenic plant cell or a transgenic plant tissue or a transgenic plant, which comprises introducing, into the plant, the plant cell or the plant tissue, the nucleic acid construct according to the invention, the vector according to the invention, the nucleic acid molecule characterized herein as being contained in the 30 nucleic acid construct of the invention or the nucleic acid molecule according to the invention, whereby the introduced nucleic acid molecules, nucleic acid construct and/or vector is not integrated into the genome of the host or host cell. Therefore the transformants are not stable during the propagation of the host in respect of the introduced nucleic acid molecules, nucleic acid construct and/or vector.

35 **[0363.0.0.0]** In the process according to the invention, transgenic organisms are also to be understood as meaning - if they take the form of plants - plant cells, plant tissues, plant organs such as root, shoot, stem, seed, flower, tuber or leaf, or intact plants which are grown for the production of the fine chemical.

[0364.0.0.0] Growing is to be understood as meaning for example culturing the transgenic plant cells, plant tissue or plant organs on or in a nutrient medium or the intact plant on or in a substrate, for example in hydroponic culture, potting compost or on a field soil.

- 5 **[0365.0.0.0]** In a further advantageous embodiment of the process, the nucleic acid molecules can be expressed in single-celled plant cells (such as algae), see Falciatore et al., 1999, *Marine Biotechnology* 1 (3): 239-251 and references cited therein, and plant cells from higher plants (for example spermatophytes such as crops). Examples of plant expression vectors encompass those which are described in detail herein or in:
- 10 Becker, D. [(1992) *Plant Mol. Biol.* 20:1195-1197] and Bevan, M.W. [(1984), *Nucl. Acids Res.* 12:8711-8721; *Vectors for Gene Transfer in Higher Plants*; in: *Transgenic Plants*, Vol. 1, Engineering and Utilization, Ed.: Kung and R. Wu, Academic Press, 1993, pp. 15-38]. An overview of binary vectors and their use is also found in Hellens, R. [(2000), *Trends in Plant Science*, Vol. 5 No.10, 446-451.

- 15 **[0366.0.0.0]** Vector DNA can be introduced into prokaryotic or eukaryotic cells via conventional transformation or transfection techniques. The terms "transformation" and "transfection" include conjugation and transduction and, as used in the present context, are intended to encompass a multiplicity of prior-art methods for introducing foreign nucleic acid molecules (for example DNA) into a host cell, including calcium phosphate coprecipitation or calcium chloride coprecipitation, DEAE-dextran-mediated
- 20 transfection, PEG-mediated transfection, lipofection, natural competence, chemically mediated transfer, electroporation or particle bombardment. Suitable methods for the transformation or transfection of host cells, including plant cells, can be found in Sambrook et al. (*Molecular Cloning: A Laboratory Manual*, 2nd Ed., Cold Spring Harbor Laboratory, Cold Spring Harbor Laboratory Press, Cold Spring Harbor, NY, 1989) and in other laboratory handbooks such as *Methods in Molecular Biology*, 1995, Vol. 44, *Agrobacterium* protocols, Ed.: Gartland and Davey, Humana Press, Totowa, New Jersey.
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- 30 **[0367.0.0.0]** The above-described methods for the transformation and regeneration of plants from plant tissues or plant cells are exploited for transient or stable transformation of plants. Suitable methods are the transformation of protoplasts by polyethylene-glycol-induced DNA uptake, the biolistic method with the gene gun - known as the particle bombardment method -, electroporation, the incubation of dry embryos in DNA-containing solution, microinjection and the *Agrobacterium*-mediated
- 35 gene transfer. The abovementioned methods are described for example in B. Jenes, *Techniques for Gene Transfer*, in: *Transgenic Plants*, Vol. 1, Engineering and Utilization, edited by S.D. Kung and R. Wu, Academic Press (1993) 128-143 and in Potrykus *Annu. Rev. Plant Physiol. Plant Molec. Biol.* 42 (1991) 205-225. The construct to be expressed is preferably cloned into a vector, which is suitable for transforming
- 40 *Agrobacterium tumefaciens*, for example pBin19 (Bevan, *Nucl. Acids Res.* 12 (1984).

- 8711). *Agrobacteria* transformed with such a vector can then be used in the known manner for the transformation of plants, in particular crop plants, such as, for example, tobacco plants, for example by bathing scarified leaves or leaf segments in an agrobacterial solution and subsequently culturing them in suitable media. The transformation of plants with *Agrobacterium tumefaciens* is described for example by Höfgen and Willmitzer in *Nucl. Acid Res.* (1988) 16, 9877 or known from, inter alia, F.F. White, *Vectors for Gene Transfer in Higher Plants*; in *Transgenic Plants*, Vol. 1, Engineering and Utilization, edited by S.D. Kung and R. Wu, Academic Press, 1993, pp. 15-38.
- 10 **[0368.0.0.0]** To select for the successful transfer of the nucleic acid molecule, vector or nucleic acid construct of the invention according to the invention into a host organism, it is advantageous to use marker genes as have already been described above in detail. It is known of the stable or transient integration of nucleic acids into plant cells that only a minority of the cells takes up the foreign DNA and, if desired, integrates it into its genome, depending on the expression vector used and the transfection technique used. To identify and select these integrants, a gene encoding for a selectable marker (as described above, for example resistance to antibiotics) is usually introduced into the host cells together with the gene of interest. Preferred selectable markers in plants comprise those, which confer resistance to an herbicide such as glyphosate or gluphosinate. Other suitable markers are, for example, markers, which encode genes involved in biosynthetic pathways of, for example, sugars or amino acids, such as β -galactosidase, *ura3* or *ilv2*. Markers, which encode genes such as luciferase, *gfp* or other fluorescence genes, are likewise suitable. These markers and the aforementioned markers can be used in mutants in whom these genes are not functional since, for example, they have been deleted by conventional methods. Furthermore, nucleic acid molecules, which encode a selectable marker, can be introduced into a host cell on the same vector as those, which encode the polypeptides of the invention or used in the process or else in a separate vector. Cells which have been transfected stably with the nucleic acid introduced can be identified for example by selection (for example, cells which have integrated the selectable marker survive whereas the other cells die).
- 35 **[0369.0.0.0]** Since the marker genes, as a rule specifically the gene for resistance to antibiotics and herbicides, are no longer required or are undesired in the transgenic host cell once the nucleic acids have been introduced successfully, the process according to the invention for introducing the nucleic acids advantageously employs techniques which enable the removal, or excision, of these marker genes. One such a method is what is known as cotransformation. The cotransformation method employs two vectors simultaneously for the transformation, one vector bearing the nucleic acid according to the invention and a second bearing the marker gene(s). A large proportion of transformants receives or, in the case of plants, comprises (up to 40% of the transformants and above), both vectors. In case of transformation with *Agrobacteria*,
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the transformants usually receive only a part of the vector, the sequence flanked by the T-DNA which usually represents the expression cassette. The marker genes can subsequently be removed from the transformed plant by performing crosses. In another method, marker genes integrated into a transposon are used for the transformation together with desired nucleic acid (known as the Ac/Ds technology). The transformants can be crossed with a transposase resource or the transformants are transformed with a nucleic acid construct conferring expression of a transposase, transiently or stable. In some cases (approx. 10%), the transposon jumps out of the genome of the host cell once transformation has taken place successfully and is lost. In a further number of cases, the transposon jumps to a different location. In these cases, the marker gene must be eliminated by performing crosses. In microbiology, techniques were developed which make possible, or facilitate, the detection of such events. A further advantageous method relies on what are known as recombination systems, whose advantage is that elimination by crossing can be dispensed with. The best-known system of this type is what is known as the Cre/lox system. Cre1 is a recombinase, which removes the sequences located between the loxP sequences. If the marker gene is integrated between the loxP sequences, it is removed, once transformation has taken place successfully, by expression of the recombinase. Further recombination systems are the HIN/HIX, FLP/FRT and REP/STB system (Tribble et al., J. Biol. Chem., 275, 2000: 22255-22267; Velmurugan et al., J. Cell Biol., 149, 2000: 553-566). A site-specific integration into the plant genome of the nucleic acid sequences according to the invention is possible. Naturally, these methods can also be applied to microorganisms such as yeast, fungi or bacteria.

[0370.0.0.0] Agrobacteria transformed with an expression vector according to the invention may also be used in the manner known per se for the transformation of plants such as experimental plants like Arabidopsis or crop plants, such as, for example, cereals, maize, oats, rye, barley, wheat, soya, rice, cotton, sugarbeet, canola, sunflower, flax, hemp, potato, tobacco, tomato, carrot, bell peppers, oilseed rape, tapioca, cassava, arrow root, tagetes, alfalfa, lettuce and the various tree, nut, and grapevine species, in particular oil-containing crop plants such as soya, peanut, castor-oil plant, sunflower, maize, cotton, flax, oilseed rape, coconut, oil palm, safflower (Carthamus tinctorius) or cocoa beans, for example by bathing scarified leaves or leaf segments in an agrobacterial solution and subsequently growing them in suitable media.

[0371.0.0.0] In addition to the transformation of somatic cells, which then has to be regenerated into intact plants, it is also possible to transform the cells of plant meristems and in particular those cells which develop into gametes. In this case, the transformed gametes follow the natural plant development, giving rise to transgenic plants. Thus, for example, seeds of Arabidopsis are treated with agrobacteria and seeds are obtained from the developing plants of which a certain proportion is transformed and thus transgenic (Feldman, KA and Marks MD (1987). Mol Gen Genet

208:274-289; Feldmann K (1992). In: C Koncz, N-H Chua and J Shell, eds, *Methods in Arabidopsis Research*. Word Scientific, Singapore, pp. 274-289). Alternative methods are based on the repeated removal of the inflorescences and incubation of the excision site in the center of the rosette with transformed agrobacteria, whereby transformed seeds can likewise be obtained at a later point in time (Chang (1994). *Plant J.* 5: 551-558; Katavic (1994). *Mol Gen Genet*, 245: 363-370). However, an especially effective method is the vacuum infiltration method with its modifications such as the "floral dip" method. In the case of vacuum infiltration of Arabidopsis, intact plants under reduced pressure are treated with an agrobacterial suspension (Bechthold, N (1993). *C R Acad Sci Paris Life Sci*, 316: 1194-1199), while in the case of the "floral dip" method the developing floral tissue is incubated briefly with a surfactant-treated agrobacterial suspension (Clough, SJ und Bent, AF (1998). *The Plant J.* 16, 735-743). A certain proportion of transgenic seeds are harvested in both cases, and these seeds can be distinguished from nontransgenic seeds by growing under the above-described selective conditions. In addition the stable transformation of plastids is of advantages because plastids are inherited maternally in most crops reducing or eliminating the risk of transgene flow through pollen. The transformation of the chloroplast genome is generally achieved by a process, which has been schematically displayed in Klaus et al., 2004 (*Nature Biotechnology* 22(2), 225-229). Briefly the sequences to be transformed are cloned together with a selectable marker gene between flanking sequences homologous to the chloroplast genome. These homologous flanking sequences direct site-specific integration into the plastome. Plastidal transformation has been described for many different plant species and an overview can be taken from Bock (2001) *Transgenic plastids in basic research and plant biotechnology*. *J Mol Biol.* 2001 Sep 21; 312(3): 425-38 or Maliga, P (2003) *Progress towards commercialization of plastid transformation technology*. *Trends Biotechnol.* 21, 20-28. Further biotechnological progress has recently been reported in form of marker free plastid transformants, which can be produced by a transient cointegrated marker gene (Klaus et al., 2004, *Nature Biotechnology* 22(2), 225-229).

30 **[0372.0.0.0]** The genetically modified plant cells can be regenerated via all methods with which the skilled worker is familiar. Suitable methods can be found in the abovementioned publications of S.D. Kung and R. Wu, Potrykus or Höfgen and Willmitzer.

35 **[0373.0.0.0]** Accordingly, the present invention thus also relates to a plant cell comprising the nucleic acid construct according to the invention, the nucleic acid molecule according to the invention or the vector according to the invention.

40 **[0374.0.0.0]** Accordingly the present invention relates to any cell transgenic for any nucleic acid characterized as part of the invention, e.g. conferring the increase of the fine chemical in a cell or an organism or a part thereof, e.g. the nucleic acid molecule of the invention, the nucleic acid construct of the invention, the antisense molecule of the

invention, the vector of the invention or a nucleic acid molecule encoding the polypeptide of the invention, e.g. encoding a polypeptide having the biological activity of the protein of the invention. Due to the above mentioned activity the fine chemical content in a cell or an organism is increased. For example, due to modulation or manipulation, the cellular activity is increased, e.g. due to an increased expression or specific activity of the subject matters of the invention in a cell or an organism or a part thereof. Transgenic for a polypeptide having biological activity of the protein of the invention or activity means herein that due to modulation or manipulation of the genome, the biological activity of the protein of the invention is increased in the cell or organism or part thereof. Examples are described above in context with the process of the invention

[0375.0.0.0] "Transgenic", for example regarding a nucleic acid molecule, an nucleic acid construct or a vector comprising said nucleic acid molecule or an organism transformed with said nucleic acid molecule, nucleic acid construct or vector, refers to all those subjects originating by recombinant methods in which either

- a) the nucleic acid sequence, or
- b) a genetic control sequence linked operably to the nucleic acid sequence, for example a promoter, or
- c) (a) and (b)

are not located in their natural genetic environment or have been modified by recombinant methods, an example of a modification being a substitution, addition, deletion, inversion or insertion of one or more nucleotide residues. Natural genetic environment refers to the natural chromosomal locus in the organism of origin, or to the presence in a genomic library. In the case of a genomic library, the natural genetic environment of the nucleic acid sequence is preferably retained, at least in part. The environment flanks the nucleic acid sequence at least at one side and has a sequence of at least 50 bp, preferably at least 500 bp, especially preferably at least 1000 bp, very especially preferably at least 5000 bp, in length.

[0376.0.0.0] A naturally occurring expression cassette - for example the naturally occurring combination of the promoter of the protein of the invention with the corresponding protein gene - becomes a transgenic expression cassette when it is modified by non-natural, synthetic "artificial" methods such as, for example, mutagenization. Such methods have been described (US 5,565,350; WO 00/15815; also see above).

[0377.0.0.0] Further, the plant cell, plant tissue or plant can also be transformed such that further enzymes and proteins are (over)expressed which expression supports an increase of the fine chemical.

[0378.0.0.0] However, transgenic also means that the nucleic acids according to the invention are located at their natural position in the genome of an organism, but that the sequence has been modified in comparison with the natural sequence and/or that the regulatory sequences of the natural sequences have been modified. Preferably, transgenic/recombinant is to be understood as meaning the transcription of the nucleic acids used in the process according to the invention occurs at a non-natural position in the genome, that is to say the expression of the nucleic acids is homologous or, preferably, heterologous. This expression can be transiently or of a sequence integrated stably into the genome.

[0379.0.0.0] The term "transgenic plants" used in accordance with the invention also refers to the progeny of a transgenic plant, for example the T₁, T₂, T₃ and subsequent plant generations or the BC₁, BC₂, BC₃ and subsequent plant generations. Thus, the transgenic plants according to the invention can be raised and selfed or crossed with other individuals in order to obtain further transgenic plants according to the invention. Transgenic plants may also be obtained by propagating transgenic plant cells vegetatively. The present invention also relates to transgenic plant material, which can be derived from a transgenic plant population according to the invention. Such material includes plant cells and certain tissues, organs and parts of plants in all their manifestations, such as seeds, leaves, anthers, fibers, tubers, roots, root hairs, stems, embryo, calli, cotyledons, petioles, harvested material, plant tissue, reproductive tissue and cell cultures, which are derived from the actual transgenic plant and/or can be used for bringing about the transgenic plant.

[0380.0.0.0] Any transformed plant obtained according to the invention can be used in a conventional breeding scheme or in in vitro plant propagation to produce more transformed plants with the same characteristics and/or can be used to introduce the same characteristic in other varieties of the same or related species. Such plants are also part of the invention. Seeds obtained from the transformed plants genetically also contain the same characteristic and are part of the invention. As mentioned before, the present invention is in principle applicable to any plant and crop that can be transformed with any of the transformation method known to those skilled in the art. Another embodiment of the invention is the use of the nucleic acid molecule as claimed in above in mapping and breeding processes for the identification of plant varieties having and increased capacity for production of the fine chemical.

[0381.0.0.0] In an especially preferred embodiment, the organism, the host cell, plant cell, plant, microorganism or plant tissue according to the invention is transgenic.

[0382.0.0.0] Accordingly, the invention therefore relates to transgenic organisms transformed with at least one nucleic acid molecule, nucleic acid construct or vector according to the invention, and to cells, cell cultures, tissues, parts - such as, for example, in the case of plant organisms, plant tissue, for example leaves, roots and the

like - or propagation material derived from such organisms, or intact plants. The terms "recombinant (host)", and "transgenic (host)" are used interchangeably in this context. Naturally, these terms refer not only to the host organism or target cell in question, but also to the progeny, or potential progeny, of these organisms or cells. Since certain
5 modifications may occur in subsequent generations owing to mutation or environmental effects, such progeny is not necessarily identical with the parental cell, but still comes within the scope of the term as used herein.

[0383.0.0.0] Suitable organisms for the process according to the invention or as hosts are all these eukaryotic or prokaryotic organisms, which are capable of
10 synthesizing the fine chemical. The organisms used as hosts are microorganisms, such as bacteria, fungi, yeasts or algae, non-human animals, or plants, such as dictotyledonous or monocotyledonous plants.

[0384.0.0.0] In principle all plants can be used as host organism, especially the plants mentioned above as source organism. Preferred transgenic plants are, for
15 example, selected from the families Aceraceae, Anacardiaceae, Apiaceae, Asteraceae, Brassicaceae, Cactaceae, Cucurbitaceae, Euphorbiaceae, Fabaceae, Malvaceae, Nymphaeaceae, Papaveraceae, Rosaceae, Salicaceae, Solanaceae, Arecaceae, Bromeliaceae, Cyperaceae, Iridaceae, Liliaceae, Orchidaceae, Gentianaceae, Labiaceae, Magnoliaceae, Ranunculaceae, Carifolaceae, Rubiaceae, Scrophulariaceae,
20 Caryophyllaceae, Ericaceae, Polygonaceae, Violaceae, Juncaceae or Poaceae and preferably from a plant selected from the group of the families Apiaceae, Asteraceae, Brassicaceae, Cucurbitaceae, Fabaceae, Papaveraceae, Rosaceae, Solanaceae, Liliaceae or Poaceae. Preferred are crop plants such as plants advantageously selected from the group of the genus peanut, oilseed rape, canola, sunflower,
25 safflower, olive, sesame, hazelnut, almond, avocado, bay, pumpkin/squash, linseed, soya, pistachio, borage, maize, wheat, rye, oats, sorghum and millet, triticale, rice, barley, cassava, potato, sugarbeet, egg plant, alfalfa, and perennial grasses and forage plants, oil palm, vegetables (brassicas, root vegetables, tuber vegetables, pod
vegetables, fruiting vegetables, onion vegetables, leafy vegetables and stem
30 vegetables), buckwheat, Jerusalem artichoke, broad bean, vetches, lentil, dwarf bean, lupin, clover and Lucerne for mentioning only some of them.

[0385.0.0.0] Preferred plant cells, plant organs, plant tissues or parts of plants originate from the under source organism mentioned plant families, preferably from the abovementioned plant genus, more preferred from abovementioned plants species.

35 **[0386.0.0.0]** Transgenic plants comprising the fine chemical synthesized in the process according to the invention can be marketed directly without isolation of the compounds synthesized. In the process according to the invention, plants are understood as meaning all plant parts, plant organs such as leaf, stalk, root, tubers or seeds or propagation material or harvested material or the intact plant. In this context,

the seed encompasses all parts of the seed such as the seed coats, epidermal cells, seed cells, endosperm or embryonic tissue. The fine chemical produced in the process according to the invention may, however, also be isolated from the plant in free or bound form. The fine chemical produced by this process can be harvested by
5 harvesting the organisms either from the culture in which they grow or from the field. This can be done via expressing, grinding and/or extraction, salt precipitation and/or ion-exchange chromatography of the plant parts, preferably the plant seeds, plant fruits, plant tubers and the like.

[0387.0.0.0] In a further embodiment, the present invention relates to a process for
10 the generation of a microorganism, comprising the introduction, into the microorganism or parts thereof, of the nucleic acid construct of the invention, or the vector of the invention or the nucleic acid molecule of the invention.

[0388.0.0.0] In another embodiment, the present invention relates also to a
15 transgenic microorganism comprising the nucleic acid molecule of the invention, the nucleic acid construct of the invention or the vector as of the invention. Appropriate microorganisms have been described herein before under source organism, preferred are in particular aforementioned strains suitable for the production of fine chemicals.

[0389.0.0.0] Accordingly, the present invention relates also to a process according to
20 the present invention whereby the produced fine chemical or fine chemical composition is isolated.

[0390.0.0.0] In this manner, more than 50% by weight, advantageously more than
25 60% by weight, preferably more than 70% by weight, especially preferably more than 80% by weight, very especially preferably more than 90% by weight, of the fine chemical produced in the process can be isolated. The resulting fine chemical can, if appropriate, subsequently be further purified, if desired mixed with other active ingredients such as vitamins, amino acids, carbohydrates, antibiotics and the like, and, if appropriate, formulated.

[0391.0.0.0] The fine chemical obtained in the process is suitable as starting material
30 for the synthesis of further products of value. For example, they can be used in combination with other ingredients or alone for the production of pharmaceuticals, foodstuffs, animal feeds or cosmetics. Accordingly, the present invention relates a method for the production of a pharmaceuticals, food stuff, animal feeds, nutrients or cosmetics comprising the steps of the process according to the invention, including the isolation of the fine chemical or fine chemical composition produced and if desired
35 formulating the product with a pharmaceutical acceptable carrier or formulating the product in a form acceptable for an application in agriculture. A further embodiment according to the invention is the use of the fine chemical produced in the process or of

the transgenic organisms in animal feeds, foodstuffs, medicines, food supplements, cosmetics or pharmaceuticals.

- [0392.0.0.0]** In principle all microorganisms can be used as host organism especially the ones mentioned under source organism above. It is advantageous to use in the process of the invention transgenic microorganisms such as fungi such as the genus *Claviceps* or *Aspergillus* or Gram-positive bacteria such as the genera *Bacillus*, *Corynebacterium*, *Micrococcus*, *Brevibacterium*, *Rhodococcus*, *Nocardia*, *Caseobacter* or *Arthrobacter* or Gram-negative bacteria such as the genera *Escherichia*, *Flavobacterium* or *Salmonella* or yeasts such as the genera *Rhodotorula*, *Saccharomyces*, *Hansenula* or *Candida*. Particularly advantageous organisms are selected from the group of genera *Corynebacterium*, *Brevibacterium*, *Escherichia*, *Bacillus*, *Rhodotorula*, *Saccharomyces*, *Hansenula*, *Candida*, *Claviceps* or *Flavobacterium*. It is very particularly advantageous to use in the process of the invention microorganisms selected from the group of genera and species consisting of *Saccharomyces cerevisiae*, *Hansenula anomala*, *Candida utilis*, *Claviceps purpurea*, *Bacillus circulans*, *Bacillus subtilis*, *Bacillus sp.*, *Brevibacterium albidum*, *Brevibacterium album*, *Brevibacterium cerinum*, *Brevibacterium flavum*, *Brevibacterium glutamigenes*, *Brevibacterium iodinum*, *Brevibacterium ketoglutamicum*, *Brevibacterium lactofermentum*, *Brevibacterium linens*, *Brevibacterium roseum*, *Brevibacterium saccharolyticum*, *Brevibacterium sp.*, *Corynebacterium acetoacidophilum*, *Corynebacterium acetoglutamicum*, *Corynebacterium ammoniagenes*, *Corynebacterium glutamicum* (= *Micrococcus glutamicum*), *Corynebacterium melassecola*, *Corynebacterium sp.* or *Escherichia coli*, specifically *Saccharomyces cerevisiae*, *Escherichia coli* K12 and its described strains.
- [0393.0.0.0]** The process of the invention is, when the host organisms are microorganisms, advantageously carried out at a temperature between 0°C and 95°C, preferably between 10°C and 85°C, particularly preferably between 15°C and 75°C, very particularly preferably between 15°C and 45°C. The pH is advantageously kept at between pH 4 and 12, preferably between pH 6 and 9, particularly preferably between pH 7 and 8, during this. The process of the invention can be operated batchwise, semibatchwise or continuously. A summary of known cultivation methods is to be found in the textbook by Chmiel (Bioprozeßtechnik 1. Einführung in die Bioverfahrenstechnik (Gustav Fischer Verlag, Stuttgart, 1991)) or in the textbook by Storhas (Bioreaktoren und periphere Einrichtungen (Vieweg Verlag, Braunschweig/Wiesbaden, 1994)). The culture medium to be used must meet the requirements of the respective strains in a suitable manner. Descriptions of culture media for various microorganisms are present in the handbook "Manual of Methods for General Bacteriology" of the American Society for Bacteriology (Washington D. C., USA, 1981). These media, which can be employed according to the invention include, as described above, usually one or more carbon sources, nitrogen sources, inorganic salts, vitamins and/or trace elements. Preferred carbon sources are sugars such as mono-, di- or polysaccharides. Examples of very

good carbon sources are glucose, fructose, mannose, galactose, ribose, sorbose, ribulose, lactose, maltose, sucrose, raffinose, starch or cellulose. Sugars can also be added to the media via complex compounds such as molasses, or other byproducts of sugar refining. It may also be advantageous to add mixtures of various carbon sources.

5 Other possible carbon sources are oils and fats such as, for example, soybean oil, sunflower oil, peanut oil and/or coconut fat, fatty acids such as, for example, palmitic acid, stearic acid and/or linoleic acid, alcohols and/or polyalcohols such as, for example, glycerol, methanol and/or ethanol and/or organic acids such as, for example, acetic acid and/or lactic acid. Nitrogen sources are usually organic or inorganic
10 nitrogen compounds or materials, which contain these compounds. Examples of nitrogen sources include ammonia in liquid or gaseous form or ammonium salts such as ammonium sulfate, ammonium chloride, ammonium phosphate, ammonium carbonate or ammonium nitrate, nitrates, urea, amino acids or complex nitrogen sources such as corn steep liquor, soybean meal, soybean protein, yeast extract, meat
15 extract and others. The nitrogen sources may be used singly or as a mixture. Inorganic salt compounds, which may be present in the media include the chloride, phosphorus or sulfate salts of calcium, magnesium, sodium, cobalt, molybdenum, potassium, manganese, zinc, copper and iron.

[0394.0.0.0] For preparing sulfur-containing fine chemicals, in particular the fine
20 chemical, it is possible to use as sulfur source inorganic sulfur-containing compounds such as, for example, sulfates, sulfites, dithionites, tetrathionates, thiosulfates, sulfides or else organic sulfur compounds such as mercaptans and thiols.

[0395.0.0.0] It is possible to use as phosphorus source phosphoric acid, potassium dihydrogenphosphate or dipotassium hydrogenphosphate or the corresponding
25 sodium-containing salts. Chelating agents can be added to the medium in order to keep the metal ions in solution. Particularly suitable chelating agents include dihydroxyphenols such as catechol or protocatechuate, or organic acids such as citric acid. The fermentation media employed according to the invention for cultivating microorganisms normally also contain other growth factors such as vitamins or growth
30 promoters, which include, for example, biotin, riboflavin, thiamine, folic acid, nicotinic acid, pantothenate and pyridoxine. Growth factors and salts are often derived from complex media components such as yeast extract, molasses, corn steep liquor and the like. Suitable precursors can moreover be added to the culture medium. The exact composition of the media compounds depends greatly on the particular experiment and
35 is chosen individually for each specific case. Information about media optimization is obtainable from the textbook "Applied Microbiol. Physiology, A Practical Approach" (editors P.M. Rhodes, P.F. Stanbury, IRL Press (1997) pp. 53-73, ISBN 0 19 963577 3). Growth media can also be purchased from commercial suppliers such as Standard 1 (Merck) or BHI (Brain heart infusion, DIFCO) and the like. All media components are
40 sterilized either by heat (1.5 bar and 121°C for 20 min) or by sterilizing filtration. The components can be sterilized either together or, if necessary, separately. All media

components can be present at the start of the cultivation or optionally be added continuously or batchwise. The temperature of the culture is normally between 15°C and 45°C, preferably at 25°C to 40°C, and can be kept constant or changed during the experiment. The pH of the medium should be in the range from 5 to 8.5, preferably around 7. The pH for the cultivation can be controlled during the cultivation by adding basic compounds such as sodium hydroxide, potassium hydroxide, ammonia or aqueous ammonia or acidic compounds such as phosphoric acid or sulfuric acid. Foaming can be controlled by employing antifoams such as, for example fatty acid polyglycol esters. The stability of plasmids can be maintained by adding to the medium suitable substances having a selective effect, for example antibiotics. Aerobic conditions are maintained by introducing oxygen or oxygen-containing gas mixtures such as, for example ambient air into the culture. The temperature of the culture is normally from 20°C to 45°C and preferably from 25°C to 40°C. The culture is continued until formation of the desired product is at a maximum. This aim is normally achieved within 10 hours to 160 hours.

[0396.0.0.0] The fermentation broths obtained in this way, containing the fine chemical in particular for example amino acids such as L-methionine, L-threonine and/or L-lysine, normally have a dry matter content of from 7.5 to 25% by weight. Sugar-limited fermentation is additionally advantageous, at least at the end, but especially over at least 30% of the fermentation time. This means that the concentration of utilizable sugar in the fermentation medium is kept at, or reduced to, ≥ 0 to 3 g/l during this time. The fermentation broth is then processed further. Depending on requirements, the biomass can be removed entirely or partly by separation methods, such as, for example, centrifugation, filtration, decantation or a combination of these methods, from the fermentation broth or left completely in it. The fermentation broth can then be thickened or concentrated by known methods, such as, for example, with the aid of a rotary evaporator, thin-film evaporator, falling film evaporator, by reverse osmosis or by nanofiltration. This concentrated fermentation broth can then be worked up by freeze-drying, spray drying, spray granulation or by other processes.

[0397.0.0.0] However, it is also possible to purify the fine chemical produced further. For this purpose, the product-containing composition is subjected to a chromatography on a suitable resin, in which case the desired product or the impurities are retained wholly or partly on the chromatography resin. These chromatography steps can be repeated if necessary, using the same or different chromatography resins. The skilled worker is familiar with the choice of suitable chromatography resins and their most effective use. The purified product can be concentrated by filtration or ultrafiltration and stored at a temperature at which the stability of the product is a maximum.

[0398.0.0.0] The identity and purity of the isolated compound(s) can be determined by prior art techniques. These include high performance liquid chromatography (HPLC), spectroscopic methods, mass spectrometry (MS), staining methods, thin-layer

chromatography, NIRS, enzyme assay or microbiological assays. These analytical methods are summarized in: Patek et al. (1994) Appl. Environ. Microbiol. 60:133-140; Malakhova et al. (1996) Biotekhnologiya 11 27-32; and Schmidt et al. (1998) Bioprocess Engineer. 19:67-70. Ulmann's Encyclopedia of Industrial Chemistry (1996) Vol. A27, VCH: Weinheim, pp. 89-90, pp. 521-540, pp. 540-547, pp. 559-566, 575-581 and pp. 581-587; Michal, G (1999) Biochemical Pathways: An Atlas of Biochemistry and Molecular Biology, John Wiley and Sons; Fallon, A. et al. (1987) Applications of HPLC in Biochemistry in: Laboratory Techniques in Biochemistry and Molecular Biology, Vol. 17.

10 **[0399.0.0.0]** In yet another aspect, the invention also relates to harvestable parts and to propagation material of the transgenic plants according to the invention which either contain transgenic plant cells expressing a nucleic acid molecule according to the invention or which contains cells which show an increased cellular activity of the polypeptide of the invention, e.g. an increased expression level or higher activity of the
15 described protein.

[0400.0.0.0] Harvestable parts can be in principle any useful parts of a plant, for example, flowers, pollen, seedlings, tubers, leaves, stems, fruit, seeds, roots etc. Propagation material includes, for example, seeds, fruits, cuttings, seedlings, tubers, rootstocks etc. Preferred are seeds, fruits, seedlings or tubers as harvestable or
20 propagation material.

[0401.0.0.0] The invention furthermore relates to the use of the transgenic organisms according to the invention and of the cells, cell cultures, parts - such as, for example, roots, leaves and the like as mentioned above in the case of transgenic plant organisms - derived from them, and to transgenic propagation material such as seeds
25 or fruits and the like as mentioned above, for the production of foodstuffs or feeding stuffs, pharmaceuticals or fine chemicals.

[0402.0.0.0] Accordingly in another embodiment, the present invention relates to the use of the nucleic acid molecule, the organism, e.g. the microorganism, the plant, plant cell or plant tissue, the vector, or the polypeptide of the present invention for making
30 fine chemicals such as fatty acids, carotenoids, isoprenoids, vitamins, lipids, wax esters, (poly)saccharides and/or polyhydroxyalkanoates, and/or its metabolism products, in particular, steroid hormones, cholesterol, prostaglandin, triacylglycerols, bile acids and/or ketone bodies producing cells, tissues and/or plants. There are a number of mechanisms by which the yield, production, and/or efficiency of production
35 of fatty acids, carotenoids, isoprenoids, vitamins, wax esters, lipids, (poly)saccharides and/or polyhydroxyalkanoates, and/or its metabolism products, in particular, steroid hormones, cholesterol, triacylglycerols, prostaglandin, bile acids and/or ketone bodies or further of above defined fine chemicals incorporating such an altered protein can be affected. In the case of plants, by e.g. increasing the expression of acetyl-CoA which is

the basis for many products, e.g., fatty acids, carotenoids, isoprenoids, vitamins, lipids, (poly)saccharides, wax esters, and/or polyhydroxyalkanoates, and/or its metabolism products, in particular, prostaglandin, steroid hormones, cholesterol, triacylglycerols, bile acids and/or ketone bodies in a cell, it may be possible to increase the amount of the produced said compounds thus permitting greater ease of harvesting and purification or in case of plants more efficient partitioning. Further, one or more of said metabolism products, increased amounts of the cofactors, precursor molecules, and intermediate compounds for the appropriate biosynthetic pathways may be required. Therefore, by increasing the number and/or activity of transporter proteins involved in the import of nutrients, such as carbon sources (i.e., sugars), nitrogen sources (i.e., amino acids, ammonium salts), phosphate, and sulfur, it may be possible to improve the production of acetyl CoA and its metabolism products as mentioned above, due to the removal of any nutrient supply limitations on the biosynthetic process. In particular, it may be possible to increase the yield, production, and/or efficiency of production of said compounds, e.g. fatty acids, carotenoids, isoprenoids, vitamins, wax esters, lipids, (poly)saccharides, and/or polyhydroxyalkanoates, and/or its metabolism products, in particular, steroid hormones, cholesterol, prostaglandin, triacylglycerols, bile acids and/or ketone bodies molecules etc. in plants.

[0403.0.0.0] Furthermore preferred is a method for the recombinant production of pharmaceuticals or fine chemicals in host organisms, wherein a host organism is transformed with one of the above-described nucleic acid constructs comprising one or more structural genes which encode the desired fine chemical or catalyze the biosynthesis of the desired fine chemical, the transformed host organism is cultured, and the desired fine chemical is isolated from the culture medium. This method can be applied widely to fine chemicals such as enzymes, vitamins, amino acids, sugars, fatty acids, and natural and synthetic flavorings, aroma substances and colorants or compositions comprising these. Especially preferred is the additional production of further amino acids, tocopherols and tocotrienols and carotenoids or compositions comprising said compounds. The transformed host organisms are cultured and the products are recovered from the host organisms or the culture medium by methods known to the skilled worker or the organism itself serves as food or feed supplement. The production of pharmaceuticals such as, for example, antibodies or vaccines, is described by Hood EE, Jilka JM. *Curr Opin Biotechnol.* 1999 Aug; 10(4): 382-6; Ma JK, Vine ND. *Curr Top Microbiol Immunol.* 1999; 236:275-92.

[0404.0.0.0] In one embodiment, the present invention relates to a method for the identification of a gene product conferring an increase in the fine chemical production in a cell, comprising the following steps:

- (a) contacting, e.g. hybridising, the nucleic acid molecules of a sample, e.g. cells, tissues, plants or microorganisms or a nucleic acid library, which can contain a candidate gene encoding a gene product conferring an increase in the fine

chemical after expression, with the nucleic acid molecule of the present invention;

- 5 (b) identifying the nucleic acid molecules, which hybridize under relaxed stringent conditions with the nucleic acid molecule of the present invention in particular to the nucleic acid molecule sequence shown in SEQ ID NO: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, 43, 45, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83, 85, 87, 89, 91, 93, 95, 97, 99, 101, 103, 105, 107, 109, 111, 113, 115, 117, 119, 121, 123, 125, 127, 129, 131, 133, 135, 137, 139, 141, 143, 145, 147, 149, 151, 153, 155, 157, 159, 161, 163, 165, 167, 10 169, 171, 173, 175, 177, 179, 181, 183, 185, 187, 189, 191, 193, 195, 197, 199, 201, 203, 205, 207, 209, 211, 213, 215, 217, 219, 221, 223, 225, 227, 229, 231, 233, 235, 237, 239, 241, 243, 245, 247, 249, 251, 253, 255, 257, 259, 261, 263, 265, 267, 269, 271, 273, 275, 277, 279, 281, 283, 285, 287, 289, 291, 293, 295, 297, 299, 301, 303, 305, 307, 309, 311, 313, 315, 317, 319, 321, 323, 325, 327, 15 329, 331, 333, 335, 337, 339, 341, 343, 345, 347, 349, 351, 353, 355, 357, 359, 361, 363, 365, 367, 369, 371, 373, 375, 377, 379, 381, 383, 385, 387, 389, 391 or 393 and, optionally, isolating the full length cDNA clone or complete genomic clone;
- 20 (c) introducing the candidate nucleic acid molecules in host cells, preferably in a plant cell or a microorganism, appropriate for producing the fine chemical;
- (d) expressing the identified nucleic acid molecules in the host cells;
- (e) assaying the the fine chemical level in the host cells; and
- (f) identifying the nucleic acid molecule and its gene product which expression confers an increase in the the fine chemical level in the host cell after expression 25 compared to the wild type.

[0405.0.0.0] Relaxed hybridisation conditions are: After standard hybridisation procedures washing steps can be performed at low to medium stringency conditions usually with washing conditions of 40°-55°C and salt conditions between 2xSSC and 0,2x SSC with 0,1% SDS in comparison to stringent washing conditions as e.g. 60°- 30 68°C with 0,1% SDS. Further examples can be found in the references listed above for the stringent hybridization conditions. Usually washing steps are repeated with increasing stringency and length until a useful signal to noise ratio is detected and depend on many factors as the target, e.g. its purity, GC-content, size etc, the probe, e.g. its length, is it a RNA or a DNA probe, salt conditions, washing or hybridisation 35 temperature, washing or hybridisation time etc.

[0406.0.0.0] In another embodiment, the present invention relates to a method for the identification of a gene product conferring an increase in the fine chemical production in a cell, comprising the following steps:

- 5 (a) identifying nucleic acid molecules of an organism; which can contain a candidate gene encoding a gene product conferring an increase in the fine chemical after expression, which are at least 20%, preferably 25%, more preferably 30%, even more preferred are 35%, 40% or 50%, even more preferred are 60%, 70% or 80%, most preferred are 90% or 95% or more homology to the nucleic acid molecule of the present invention, for example via homology search in a data
10 bank;
- (b) introducing the candidate nucleic acid molecules in host cells, preferably in a plant cells or microorganisms, appropriate for producing the fine chemical;
- (c) expressing the identified nucleic acid molecules in the host cells;
- (d) assaying the the fine chemcial level in the host cells; and
- 15 (e) identifying the nucleic acid molecule and its gene product which expression confers an increase in the the fine chemical level in the host cell after expression compared to the wild type.

[0407.0.0.0] The nucleic acid molecules identified can then be used for the production of the fine chemical in the same way as the nucleic acid molecule of the present invention. Accordingly, in one embodiment, the present invention relates to a
20 process for the production of the fine chemical, comprising (a) identifying a nucleic acid molecule according to aforementioned steps (a) to (f) or (a) to (e) and recovering the free or bound fine chemical from a organism having an increased cellular activity of a polypeptide encoded by the isolated nucleic acid molecule compared to a wild type.

25 **[0408.0.0.0]** Furthermore, in one embodiment, the present invention relates to a method for the identification of a compound stimulating production of the fine chemical to said plant comprising:

- a) contacting cells which express the polypeptide of the present invention or its mRNA with a candidate compound under cell cultivation conditions;
- 30 b) assaying an increase in expression of said polypeptide or said mRNA;
- c) comparing the expression level to a standard response made in the absence of said candidate compound; whereby, an increased expression over the standard indicates that the compound is stimulating production of the fine chemical.

[0409.0.0.0] Furthermore, in one embodiment, the present invention relates to a method for the screening for agonists or an antagonist of the activity of the polypeptide of the present invention or used in the process of the present invention, e.g. a polypeptide conferring an increase of the fine chemical in an organism or a part thereof after increasing the activity in an organism or a part thereof, comprising:

- (a) contacting cells, tissues, plants or microorganisms which express the polypeptide according to the invention with a candidate compound or a sample comprising a plurality of compounds under conditions which permit the expression of the polypeptide of the present invention or used in the process of the present invention;
- (b) assaying the fine chemical level or the polypeptide expression level in the cell, tissue, plant or microorganism or the media the cell, tissue, plant or microorganisms is cultured or maintained in; and
- (c) identifying an agonist or antagonist by comparing the measured fine chemical level or polypeptide of the invention or used in the invention expression level with a standard fine chemical or polypeptide expression level measured in the absence of said candidate compound or a sample comprising said plurality of compounds, whereby an increased level over the standard indicates that the compound or the sample comprising said plurality of compounds is an agonist and a decreased level over the standard indicates that the compound or the sample comprising said plurality of compounds is an antagonist.

[0410.0.0.0] Furthermore, in one embodiment, the present invention relates to a process for the identification of a compound conferring increased fine chemical production in a plant or microorganism, comprising the steps:

- (a) culturing a cell or tissue or microorganism or maintaining a plant expressing the polypeptide according to the invention or a nucleic acid molecule encoding said polypeptide and a readout system capable of interacting with the polypeptide under suitable conditions which permit the interaction of the polypeptide with said readout system in the presence of a compound or a sample comprising a plurality of compounds and capable of providing a detectable signal in response to the binding of a compound to said polypeptide under conditions which permit the expression of said readout system and the polypeptide of the present invention or used in the process of the invention; and
- (b) identifying if the compound is an effective agonist by detecting the presence or absence or increase of a signal produced by said readout system.

[0411.0.0.0] The screen for a gene product or an agonist conferring an increase in fine chemical production can be performed by growth of an organism for example a

microorganism in the presence of growth reducing amounts of an inhibitor of the synthesis of the fine chemical. Better growth, eg higher dividing rate or high dry mass in comparison to the control under such conditions would identify a gene or gene product or an agonist conferring an increase in fine chemical production.

- 5 **[0412.0.0.0]** One can think to screen for increased fine chemical production by for example resistance to a drug blocking the fine chemical synthesis and looking whether this effect is dependent on the protein of the invention e.g. comparing near identical organisms with low and high biological activity of the protein of the invention.

- 10 **[0413.0.0.0]** Said compound may be chemically synthesized or microbiologically produced and/or comprised in, for example, samples, e.g., cell extracts from, e.g., plants, animals or microorganisms, e.g. pathogens. Furthermore, said compound(s) may be known in the art but hitherto not known to be capable of suppressing or activating the polypeptide of the present invention. The reaction mixture may be a cell free extract or may comprise a cell or tissue culture. Suitable set ups for the method of
15 the invention are known to the person skilled in the art and are, for example, generally described in Alberts et al., Molecular Biology of the Cell, third edition (1994), in particular Chapter 17. The compounds may be, e.g., added to the reaction mixture, culture medium, injected into the cell or sprayed onto the plant.

- 20 **[0414.0.0.0]** If a sample containing a compound is identified in the method of the invention, then it is either possible to isolate the compound from the original sample identified as containing the compound capable of activating or increasing the content of the fine chemical in an organism or part thereof, or one can further subdivide the original sample, for example, if it consists of a plurality of different compounds, so as to reduce the number of different substances per sample and repeat the method with the
25 subdivisions of the original sample. Depending on the complexity of the samples, the steps described above can be performed several times, preferably until the sample identified according to the method of the invention only comprises a limited number of or only one substance(s). Preferably said sample comprises substances of similar chemical and/or physical properties, and most preferably said substances are identical.
30 Preferably, the compound identified according to the above-described method or its derivative is further formulated in a form suitable for the application in plant breeding or plant cell and tissue culture.

- 35 **[0415.0.0.0]** The compounds which can be tested and identified according to a method of the invention may be expression libraries, e.g., cDNA expression libraries, peptides, proteins, nucleic acids, antibodies, small organic compounds, hormones, peptidomimetics, PNAs or the like (Milner, Nature Medicine 1 (1995), 879-880; Hupp, Cell 83 (1995), 237-245; Gibbs, Cell 79 (1994), 193-198 and references cited supra). Said compounds can also be functional derivatives or analogues of known inhibitors or activators. Methods for the preparation of chemical derivatives and analogues are well

known to those skilled in the art and are described in, for example, Beilstein, Handbook of Organic Chemistry, Springer edition New York Inc., 175 Fifth Avenue, New York, N.Y. 10010 U.S.A. and Organic Synthesis, Wiley, New York, USA. Furthermore, said derivatives and analogues can be tested for their effects according to methods known in the art. Furthermore, peptidomimetics and/or computer aided design of appropriate derivatives and analogues can be used, for example, according to the methods described above. The cell or tissue that may be employed in the method of the invention preferably is a host cell, plant cell or plant tissue of the invention described in the embodiments hereinbefore.

10 **[0416.0.0.0]** Thus, in a further embodiment the invention relates to a compound obtained or identified according to the method for identifying an agonist of the invention said compound being an agonist of the polypeptide of the present invention or used in the process of the present invention.

15 **[0417.0.0.0]** Accordingly, in one embodiment, the present invention further relates to a compound identified by the method for identifying a compound of the present invention.

[0418.0.0.0] Said compound is, for example, a homologous of the polypeptide of the present invention. Homologues of the polypeptide of the present invention can be generated by mutagenesis, e.g., discrete point mutation or truncation of the polypeptide of the present invention. As used herein, the term "homologue" refers to a variant form of the protein, which acts as an agonist of the activity of the polypeptide of the present invention. An agonist of said protein can retain substantially the same, or a subset, of the biological activities of the polypeptide of the present invention. In particular, said agonist confers the increase of the expression level of the polypeptide of the present invention and/or the expression of said agonist in an organisms or part thereof confers the increase of free and/or bound the fine chemical in the organism or part thereof.

[0419.0.0.0] In one embodiment, the invention relates to an antibody specifically recognizing the compound or agonist of the present invention.

30 **[0420.0.0.0]** The invention also relates to a diagnostic composition comprising at least one of the aforementioned nucleic acid molecules, vectors, proteins, antibodies or compounds of the invention and optionally suitable means for detection.

35 **[0421.0.0.0]** The diagnostic composition of the present invention is suitable for the isolation of mRNA from a cell and contacting the mRNA so obtained with a probe comprising a nucleic acid probe as described above under hybridizing conditions, detecting the presence of mRNA hybridized to the probe, and thereby detecting the expression of the protein in the cell. Further methods of detecting the presence of a protein according to the present invention comprise immunotechniques well known in the art, for example enzyme linked immunosorbent assay. Furthermore, it is possible to

use the nucleic acid molecules according to the invention as molecular markers or primer in plant breeding. Suitable means for detection are well known to a person skilled in the art, e.g. buffers and solutions for hybridization assays, e.g. the aforementioned solutions and buffers, further and means for Southern-, Western-, Northern- etc. -blots, as e.g. described in Sambrook et al. are known.

[0422.0.0.0] In another embodiment, the present invention relates to a kit comprising the nucleic acid molecule, the vector, the host cell, the polypeptide, the antisense nucleic acid, the antibody, plant cell, the plant or plant tissue, the harvestable part, the propagation material and/or the compound or agonist or antagonists identified according to the method of the invention.

[0423.0.0.0] The compounds of the kit of the present invention may be packaged in containers such as vials, optionally with/in buffers and/or solution. If appropriate, one or more of said components might be packaged in one and the same container. Additionally or alternatively, one or more of said components might be adsorbed to a solid support as, e.g. a nitrocellulose filter, a glass plate, a chip, or a nylon membrane or to the well of a micro titerplate. The kit can be used for any of the herein described methods and embodiments, e.g. for the production of the host cells, transgenic plants, pharmaceutical compositions, detection of homologous sequences, identification of antagonists or agonists, as food or feed or as a supplement thereof, as supplement for the treating of plants, etc.

[0424.0.0.0] Further, the kit can comprise instructions for the use of the kit for any of said embodiments, in particular for the use for producing organisms or part thereof having an increased free or bound the fine chemical content.

[0425.0.0.0] In one embodiment said kit comprises further a nucleic acid molecule encoding one or more of the aforementioned protein, and/or an antibody, a vector, a host cell, an antisense nucleic acid, a plant cell or plant tissue or a plant.

[0426.0.0.0] In a further embodiment, the present invention relates to a method for the production of a agricultural composition providing the nucleic acid molecule, the vector or the polypeptide of the invention or comprising the steps of the method according to the invention for the identification of said compound, agonist or antagonist; and formulating the nucleic acid molecule, the vector or the polypeptide of the invention or the agonist, or compound identified according to the methods or processes of the present invention or with use of the subject matters of the present invention in a form applicable as plant agricultural composition.

[0427.0.0.0] In another embodiment, the present invention relates to a method for the production of a "the fine chemical"-production supporting plant culture composition comprising the steps of the method for of the present invention; and formulating the compound identified in a form acceptable as agricultural composition.

[0428.0.0.0] Under "acceptable as agricultural composition" is understood, that such a composition is in agreement with the laws regulating the content of fungicides, plant nutrients, herbicides, etc. Preferably such a composition is without any harm for the protected plants and the animals (humans included) fed therewith.

- 5 **[0429.0.0.0]** The present invention also pertains to several embodiments relating to further uses and methods. The nucleic acid molecule, polypeptide, protein homologues, fusion proteins, primers, vectors, host cells, described herein can be used in one or more of the following methods: identification of plants useful for fine chemical production as mentioned and related organisms; mapping of genomes; identification
10 and localization of sequences of interest; evolutionary studies; determination of regions required for function; modulation of an activity.

- [0430.0.0.0]** The nucleic acid molecule of the invention, the vector of the invention or the nucleic acid construct of the invention may also be useful for the production of organisms resistant to inhibitors of the fine chemical e.g. the amino acid production
15 biosynthesis pathways. In particular, the overexpression of the polypeptide of the present invention may protect plants against herbicides, which block the amino acid, in particular the fine chemical, synthesis in said plant. Examples of herbicides blocking the fine chemical synthesis e.g. the amino acid synthesis in plants are for example sulfonylurea and imidazolinone herbicides which catalyze the first step in branched-
20 chain amino acid biosynthesis

- [0431.0.0.0]** Accordingly, the nucleic acid molecules of the present invention have a variety of uses. First, they may be used to identify an organism or a close relative thereof. Also, they may be used to identify the presence thereof or a relative thereof in a mixed population of microorganisms or plants. By probing the extracted genomic
25 DNA of a culture of a unique or mixed population of plants under stringent conditions with a probe spanning a region of the gene of the present invention which is unique to this, one can ascertain whether the present invention has been used or whether it or a close relative is present.

- [0432.0.0.0]** Further, the nucleic acid molecule of the invention may be sufficiently
30 homologous to the sequences of related species such that these nucleic acid molecules may serve as markers for the construction of a genomic map in related organism.

[0433.0.0.0] Accordingly, the present invention relates to a method for breeding plants for the production of the fine chemical, comprising

- 35 (a) providing a first plant variety produced according to the process of the invention preferably (over)expressing the nucleic acid molecule of the invention;
- (b) crossing the first plant variety with a second plant variety; and

- (c) selecting the offspring plants which overproduce the fine chemical by means of analysis the distribution of a molecular marker in the offspring representing the first plant variety and its capability to (over)produce the fine chemical.

5 [0434.0.0.0] Details about the use of molecular markers in breeding can be found in Kumar et al., 1999 (Biotech Adv., 17:143-182) and Peleman and van der Voort 2003 (Trends Plant Sci. 2003 Jul;8(7):330-334). The molecular marker can e.g. relate to the nucleic acid molecule of the invention and/or its expression level. Accordingly, the molecular marker can be a probe or a PCR primer set useful for identification of the genomic existence or genomic localisation of the nucleic acid molecule of the invention, e.g. in a Southern blot analysis or a PCR or its expression level, i.g. in a Northern Blot analysis or a quantitative PCR. Accordingly, in one embodiment, the present invention relates to the use of the nucleic acid molecule of the present invention or encoding the polypeptide of the present invention as molecular marker for breeding.

15 [0435.0.0.0] The nucleic acid molecules of the invention are also useful for evolutionary and protein structural studies. By comparing the sequences of the invention or used in the process of the invention to those encoding similar enzymes from other organisms, the evolutionary relatedness of the organisms can be assessed. Similarly, such a comparison permits an assessment of which regions of the sequence are conserved and which are not, which may aid in determining those regions of the protein which are essential for the functioning of the enzyme. This type of determination is of value for protein engineering studies and may give an indication of what the protein can tolerate in terms of mutagenesis without losing function.

25 [0436.0.0.0] Accordingly, the nucleic acid molecule of the invention can be used for the identification of other nucleic acids conferring an increase of the fine chemical after expression.

[0437.0.0.0] Further, the nucleic acid molecule of the invention or a fragment of a gene conferring the expression of the polypeptide of the invention, preferably comprising the nucleic acid molecule of the invention, can be used for marker assisted breeding or association mapping of the fine chemical derived traits

30 [0438.0.0.0] Accordingly, the nucleic acid of the invention, the polypeptide of the invention, the nucleic acid construct of the invention, the organisms, the host cell, the microorganisms, the plant, plant tissue, plant cell, or the part thereof of the invention, the vector of the invention, the agonist identified with the method of the invention, the nucleic acid molecule identified with the method of the present invention, can be used for the production of the fine chemical or of the fine chemical and one or more other ingredients such as amino acids, in particular Threonine, Alanine, Glutamine, Glutamic acid, Valine, Asparagine, Phenylalanine, Leucine, Proline, Tryptophan Tyrosine, Valine, Isoleucine and Arginine.

Accordingly, the nucleic acid of the invention, or the nucleic acid molecule identified with the method of the present invention or the complement sequences thereof, the polypeptide of the invention, the nucleic acid construct of the invention, the organisms, the host cell, the microorganisms, the plant, plant tissue, plant cell, or the part thereof
5 of the invention, the vector of the invention, the antagonist identified with the method of the invention, the antibody of the present invention, the antisense molecule of the present invention, can be used for the reduction of the fine chemical in a organism or part thereof, e.g. in a cell.

[0439.0.0.0] Further, the nucleic acid of the invention, the polypeptide of the
10 invention, the nucleic acid construct of the invention, the organisms, the host cell, the microorganisms, the plant, plant tissue, plant cell, or the part thereof of the invention, the vector of the invention, the antagonist or the agonist identified with the method of the invention, the antibody of the present invention, the antisense molecule of the present invention or the nucleic acid molecule identified with the method of the present
15 invention, can be used for the preparation of an agricultural composition.

[0440.0.0.0] Furthermore, the nucleic acid of the invention, the polypeptide of the invention, the nucleic acid construct of the invention, the organisms, the host cell, the microorganisms, the plant, plant tissue, plant cell, or the part thereof of the invention, the vector of the invention, antagonist or the agonist identified with the method of the
20 invention, the antibody of the present invention, the antisense molecule of the present invention or the nucleic acid molecule identified with the method of the present invention, can be used for the identification and production of compounds capable of conferring a modulation of the fine chemical levels in an organism or parts thereof, preferably to identify and produce compounds conferring an increase of the fine
25 chemical levels in an organism or parts thereof, if said identified compound is applied to the organism or part thereof, i.e. as part of its food, or in the growing or culture media.

[0441.0.0.0] These and other embodiments are disclosed and encompassed by the description and examples of the present invention. Further literature concerning any
30 one of the methods, uses and compounds to be employed in accordance with the present invention may be retrieved from public libraries, using for example electronic devices. For example the public database "Medline" may be utilized which is available on the Internet, for example under <http://www.ncbi.nlm.nih.gov/PubMed/medline.html>. Further databases and addresses, such as <http://www.ncbi.nlm.nih.gov/>,
35 <http://www.infobiogen.fr/>, <http://www.fmi.ch/biology/research-tools.html>, <http://www.tigr.org/>, are known to the person skilled in the art and can also be obtained using, e.g., <http://www.lycos.com>. An overview of patent information in biotechnology and a survey of relevant sources of patent information useful for retrospective searching and for current awareness are given in Berks, TIBTECH 12 (1994), 352-364.

[0442.0.0.0] Table 1 gives an overview about the fine chemicals produced by SEQ ID NO: 1 of the present invention.

Table 1: Fine chemicals produced with SEQ ID NO: 1 (YNL090W)

Metabolite	Method	Min	Max
Tryptophane	LC	1,26	4,39
Proline	LC	1,73	6,29
Arginine	LC	1,54	4,23
Raffinose	LC	2,57	16,05
Ferulic Acid	LC	1,40	2,41
Phenylalanine	LC	1,34	2,75
Tyrosine	LC	1,44	2,55
gamma+beta-Tocopherol	LC	0,36	0,66
Cerotic Acid (C26:0)	GC	1,41	3,78
Lignoceric Acid (C24:0)	GC	1,34	2,14
Alanine	GC	1,21	1,57
Glycine	GC	1,46	1,67
Threonine	GC	1,21	2,02
Putrescine	GC	0,18	0,42
Serine	GC	1,29	1,96
Valine	GC	1,20	2,31
Isoleucine	GC	1,30	4,35
Leucine	GC	1,51	5,01
Sinapic Acid	GC	1,28	2,08
3,4-Dihydroxyphenylalanine (=DOPA)	GC	1,37	1,87
Stearic Acid (C18:0)	GC	1,16	2,13
beta-Carotene	LC	1,77	2,68

5 Column 1 shows the metabolite produced. Column 2 mirrors the analytic method and column 3 and 4 shows the minimum and maximum production of the respective fine chemical as x-fold.

10 [0443.0.0.0] The present invention is illustrated by the examples, which follow. The present examples illustrate the basic invention without being intended as limiting the subject of the invention. The content of all of the references, patent applications, patents and published patent applications cited in the present patent application is herewith incorporated by reference.

[0444.0.0.0] Examples**[0445.0.0.0] Example 1: Cloning SEQ ID NO: 1 in Escherichia coli**

[0446.0.0.0] SEQ ID NO: 1 was cloned into the plasmids pBR322 (Sutcliffe, J.G. (1979) Proc. Natl Acad. Sci. USA, 75: 3737-3741); pACYC177 (Change & Cohen (1978) J. Bacteriol. 134: 1141-1156); plasmids of the pBS series (pBSSK+, pBSSK- and others; Stratagene, LaJolla, USA) or cosmids such as SuperCos1 (Stratagene, LaJolla, USA) or Lorist6 (Gibson, T.J. Rosenthal, A., and Waterson, R.H. (1987) Gene 53: 283-286) for expression in E. coli using known, well-established procedures (see, for example, Sambrook, J. et al. (1989) "Molecular Cloning: A Laboratory Manual". Cold Spring Harbor Laboratory Press or Ausubel, F.M. et al. (1994) "Current Protocols in Molecular Biology", John Wiley & Sons).

[0447.0.0.0] Example 2: DNA sequencing and computerized functional analysis

[0448.0.0.0] The DNA was sequenced by standard procedures, in particular the chain determination method, using ABI377 sequencers (see, for example, Fleischman, R.D. et al. (1995) "Whole-genome Random Sequencing and Assembly of Haemophilus Influenzae Rd., Science 269; 496-512").

[0449.0.0.0] Example 3: In-vivo mutagenesis

[0450.0.0.0] An *in vivo* mutagenesis of Corynebacterium glutamicum for the production of amino acids can be carried out by passing a plasmid DNA (or another vector DNA) through E. coli and other microorganisms (for example Bacillus spp. or yeasts such as Saccharomyces cerevisiae), which are not capable of maintaining the integrity of its genetic information. Usual mutator strains have mutations in the genes for the DNA repair system [for example mutHLS, mutD, mutT and the like; for comparison, see Rupp, W.D. (1996) DNA repair mechanisms in Escherichia coli and Salmonella, pp. 2277-2294, ASM: Washington]. The skilled worker knows these strains. The use of these strains is illustrated for example in Greener, A. and Callahan, M. (1994) Strategies 7; 32-34.

[0451.0.0.0] Example 4: DNA transfer between Escherichia coli and Corynebacterium glutamicum

[0452.0.0.0] Several Corynebacterium and Brevibacterium species comprise endogenous plasmids (such as, for example, pHM1519 or pBL1), which replicate autonomously (for a review, see, for example, Martin, J.F. et al. (1987) Biotechnology 5: 137-146). Shuttle vectors for Escherichia coli and Corynebacterium glutamicum can be constructed easily using standard vectors for E. coli (Sambrook, J. et al., (1989), "Molecular Cloning: A Laboratory Manual", Cold Spring Harbor Laboratory Press or Ausubel, F.M. et al. (1994) "Current Protocols in Molecular Biology", John Wiley &

Sons), which have a replication origin for, and suitable marker from, *Corynebacterium glutamicum* added. Such replication origins are preferably taken from endogenous plasmids, which have been isolated from *Corynebacterium* and *Brevibacterium* species. Genes, which are used in particular as transformation markers for these species are genes for kanamycin resistance (such as those which originate from the Tn5 or Tn-903 transposon) or for chloramphenicol resistance (Winnacker, E.L. (1987) "From Genes to Clones - Introduction to Gene Technology, VCH, Weinheim). There are many examples in the literature of the preparation of a large multiplicity of shuttle vectors which are replicated in *E. coli* and *C. glutamicum* and which can be used for various purposes including the overexpression of genes (see, for example, Yoshihama, M. et al. (1985) *J. Bacteriol.* 162: 591-597, Martin, J.F. et al., (1987) *Biotechnology*, 5: 137-146 and Eikmanns, B.J. et al. (1992) *Gene* 102: 93-98). Suitable vectors which replicate in coryneform bacteria are for example, pZ1 (Menkel et al., *Appl. Environ. Microbiol.*, 64, 1989: 549 – 554) pEkEx1 (Eikmanns et al., *Gene* 102, 1991: 93 – 98) or pHS2-1 (Sonnen et al, *Gene* 107, 1991: 69 – 74). These vectors are based on the cryptic plasmids pHM1519, pBL1 or pGA1. Other plasmid vectors such as, for example, those based on pCG4 (US 4,489,160), pNG2 (Serwold-Davis et al., *FEMS Microbiol. Lett.*, 66, 1990: 119 – 124) or pAG1 (US 5,158,891) can be used in the same manner.

[0453.0.0.0] Using standard methods, it is possible to clone a gene of interest into one of the above-described shuttle vectors and to introduce such hybrid vectors into *Corynebacterium glutamicum* strains. The transformation of *C. glutamicum* can be achieved by protoplast transformation (Kastsumata, R. et al., (1984) *J. Bacteriol.* 159, 306-311), electroporation (Liebl, E. et al., (1989) *FEMS Microbiol. Letters*, 53: 399-303) and in those cases where specific vectors are used also by conjugation (such as, for example, described in Schäfer, A., et al. (1990) *J. Bacteriol.* 172: 1663-1666). Likewise, it is possible to transfer the shuttle vectors for *C. glutamicum* to *E. coli* by preparing plasmid DNA from *C. glutamicum* (using standard methods known in the art) and transforming it into *E. coli*. This transformation step can be carried out using standard methods, but preferably using a *Mcr*-deficient *E. coli* strain, such as NM522 (Gough & Murray (1983) *J. Mol. Biol.* 166: 1-19).

[0454.0.0.0] If the transformed sequence(s) is/are to be integrated advantageously into the genome of the coryneform bacteria, standard techniques known to the skilled worker also exist for this purpose. Examples, which are used for this purpose are plasmid vectors as they have been described by Remscheid et al. (*Appl. Environ. Microbiol.*, 60, 1994: 126–132) for the duplication and amplification of the *hom-thrB* operon. In this method, the complete gene is cloned into a plasmid vector, which is capable of replication in a host such as *E. coli*, but not in *C. glutamicum*. Suitable vectors are, for example, pSUP301 (Simon et al., *Bio/Technology* 1, 1983: 784–791), pKIBmob or pK19mob (Schäfer et al., *Gene* 145, 1994: 69–73), pGEM-T (Promega Corp., Madison, WI, USA), pCR2.1-TOPO (Schuman, *J. Biol. Chem.*, 269, 1994:

32678–32684, US 5,487,993), pCR®Blunt (Invitrogen, Groningen, the Netherlands) or pEM1 (Schrumpf et al., J. Bacteriol., 173, 1991: 4510–4516).

[0455.0.0.0] Example 5: Determining the expression of the mutant/transgenic protein

- 5 **[0456.0.0.0]** The observations of the activity of a mutated, or transgenic, protein in a transformed host cell are based on the fact that the protein is expressed in a similar manner and in a similar quantity as the wild-type protein. A suitable method for determining the transcription quantity of the mutant, or transgenic, gene (a sign for the amount of mRNA which is available for the translation of the gene product) is to carry out a Northern blot (see, for example, Ausubel et al., (1988) Current Protocols in Molecular Biology, Wiley: New York), where a primer which is designed in such a way that it binds to the gene of interest is provided with a detectable marker (usually a radioactive or chemiluminescent marker) so that, when the total RNA of a culture of the organism is extracted, separated on a gel, applied to a stable matrix and incubated with this probe, the binding and quantity of the binding of the probe indicates the presence and also the amount of mRNA for this gene. Another method is a quantitative PCR. This information detects the extent to which the gene has been transcribed. Total cell RNA can be isolated from *Corynebacterium glutamicum* by a variety of methods, which are known in the art, as described in Bormann, E.R. et al., (1992) Mol. Microbiol. 6: 317-326.

- [0457.0.0.0]** Standard techniques, such as Western blot, may be employed to determine the presence or relative amount of protein translated from this mRNA (see, for example, Ausubel et al. (1988) "Current Protocols in Molecular Biology", Wiley, New York). In this method, total cell proteins are extracted, separated by gel electrophoresis, transferred to a matrix such as nitrocellulose and incubated with a probe, such as an antibody, which binds specifically to the desired protein. This probe is usually provided directly or indirectly with a chemiluminescent or colorimetric marker, which can be detected readily. The presence and the observed amount of marker indicate the presence and the amount of the sought mutant protein in the cell. However, other methods are also known.

[0458.0.0.0] Example 6: Growth of genetically modified *Corynebacterium glutamicum*: media and culture conditions

- [0460.0.0.0]** Genetically modified *Corynebacteria* are grown in synthetic or natural growth media. A number of different growth media for *Corynebacteria* are known and widely available (Lieb et al. (1989) Appl. Microbiol. Biotechnol. 32: 205-210; von der Osten et al. (1998) Biotechnology Letters 11: 11-16; Patent DE 4 120 867; Liebl (1992) "The Genus *Corynebacterium*", in: The Prokaryotes, Vol. II, Balows, A., et al., Ed. Springer-Verlag).

[0461.0.0.0] Said media which can be used according to the invention usually consist of one or more carbon sources, nitrogen sources, inorganic salts, vitamins and trace elements. Preferred carbon sources are sugars such as mono-, di- or polysaccharides. Examples of very good carbon sources are glucose, fructose, mannose, galactose, ribose, sorbose, ribulose, lactose, maltose, sucrose, raffinose, starch or cellulose. Sugars may also be added to the media via complex compounds such as molasses or other by-products of sugar refining. It may also be advantageous to add mixtures of various carbon sources. Other possible carbon sources are alcohols and/or organic acids such as methanol, ethanol, acetic acid or lactic acid. Nitrogen sources are usually organic or inorganic nitrogen compounds or materials containing said compounds. Examples of nitrogen sources include ammonia gas, aqueous ammonia solutions or ammonium salts such as NH_4Cl , or $(\text{NH}_4)_2\text{SO}_4$, NH_4OH , nitrates, urea, amino acids or complex nitrogen sources such as cornsteep liquor, soybean flour, soybean protein, yeast extract, meat extract and others. Mixtures of the above nitrogen sources may be used advantageously.

[0462.0.0.0] Inorganic salt compounds, which may be included in the media comprise the chloride, phosphorus or sulfate salts of calcium, magnesium, sodium, cobalt, molybdenum, potassium, manganese, zinc, copper and iron. Chelating agents may be added to the medium in order to keep the metal ions in solution. Particularly suitable chelating agents include dihydroxyphenols such as catechol or protocatechuate or organic acids such as citric acid. The media usually also contain other growth factors such as vitamins or growth promoters, which include, for example, biotin, riboflavin, thiamine, folic acid, nicotinic acid, panthothenate and pyridoxine. Growth factors and salts are frequently derived from complex media components such as yeast extract, molasses, cornsteep liquor and the like. The exact composition of the compounds used in the media depends heavily on the particular experiment and is decided upon individually for each specific case. Information on the optimization of media can be found in the textbook "Applied Microbiol. Physiology, A Practical Approach" (Ed. P.M. Rhodes, P.F. Stanbury, IRL Press (1997) S. 53-73, ISBN 0 19 963577 3). Growth media can also be obtained from commercial suppliers, for example Standard 1 (Merck) or BHI (Brain heart infusion, DIFCO) and the like.

[0463.0.0.0] All media components are sterilized, either by heat (20 min at 1.5 bar und 121°C) or by filter sterilization. The components may be sterilized either together or, if required, separately. All media components may be present at the start of the cultivation or added continuously or batchwise, as desired.

[0464.0.0.0] The culture conditions are defined separately for each experiment. The temperature is normally between 15°C and 45°C and may be kept constant or may be altered during the experiment. The pH of the medium should be in the range from 5 to 8.5, preferably around 7.0, and can be maintained by adding buffers to the media. An example of a buffer for this purpose is a potassium phosphate buffer. Synthetic buffers

such as MOPS, HEPES, ACES and the like may be used as an alternative or simultaneously. The culture pH value may also be kept constant during the culture period by addition of, for example, NaOH or NH₄OH. If complex media components such as yeast extract are used, additional buffers are required less since many
5 complex compounds have a high buffer capacity. When using a fermenter for the culture of microorganisms, the pH value can also be regulated using gaseous ammonia.

[0465.0.0.0] The incubation period is generally in a range of from several hours to several days. This time period is selected in such a way that the maximum amount of
10 product accumulates in the fermentation broth. The growth experiments, which are disclosed can be carried out in a multiplicity of containers such as microtiter plates, glass tubes, glass flasks or glass or metal fermenters of various sizes. To screen a large number of clones, the microorganisms should be grown in microtiter plates, glass tubes or shake flasks, either using simple flasks or baffle flasks. 100 ml shake flasks
15 filled with 10% (based on the volume) of the growth medium required are preferably used. The flasks should be shaken on an orbital shaker (amplitude 25 mm) at a rate ranging from 100 to 300 rpm. Evaporation losses can be reduced by maintaining a humid atmosphere; as an alternative, a mathematical correction should be carried out for the evaporation losses.

20 [0466.0.0.0] If genetically modified clones are examined, an unmodified control clone, or a control clone, which contains the basic plasmid without insertion, should also be included in the tests. If a transgenic sequence is expressed, a control clone should advantageously again be included in these tests. The medium is advantageously inoculated to an OD600 of 0.5 to 1.5 using cells which have been
25 grown on agar plates, such as CM plates (10 g/l glucose, 2.5 g/l NaCl, 2 g/l urea, 10 g/l polypeptone, 5 g/l yeast extract, 5 g/l meat extract, 22 g/l agar, pH value 6.8 established with 2M NaOH), which have been incubated at 30°C. The media are inoculated either by introducing a saline solution of *C. glutamicum* cells from CM plates or by addition of a liquid preculture of this bacterium.

30 [0467.0.0.0] Example 7: In-vitro analysis of the function of the proteins encoded by the transformed sequences

[0468.0.0.0] The determination of the activities and kinetic parameters of enzymes is well known in the art. Experiments for determining the activity of a specific modified
35 enzyme must be adapted to the specific activity of the wild-enzyme type, which is well within the capabilities of the skilled worker. Overviews of enzymes in general and specific details regarding the structure, kinetics, principles, methods, applications and examples for the determination of many enzyme activities can be found for example in the following literature: Dixon, M., and Webb, E.C: (1979) Enzymes, Longmans, London; Fersht (1985) Enzyme Structure and Mechanism, Freeman, New York; Walsh

- (1979) Enzymatic Reaction Mechanisms. Freeman, San Francisco; Price, N.C., Stevens, L. (1982) Fundamentals of Enzymology. Oxford Univ. Press: Oxford; Boyer, P.D. Ed. (1983) The Enzymes, 3rd Ed. Academic Press, New York; Bisswanger, H. (1994) Enzymkinetik, 2nd Ed. VCH, Weinheim (ISBN 3527300325); Bergmeyer, H.U.,
5 Bergmeyer, J., Graßl, M. Ed. (1983-1986) Methods of Enzymatic Analysis, 3rd Ed. Vol. I-XII, Verlag Chemie: Weinheim; and Ullmann's Encyclopedia of Industrial Chemistry (1987) Vol. A9, "Enzymes", VCH, Weinheim, pp. 352-363.

[0469.0.0.0] Example 8: Analysis of the effect of the nucleic acid molecule on the production of the amino acids

- 10 **[0470.0.0.0]** The effect of the genetic modification in *C. glutamicum* on the production of an amino acid can be determined by growing the modified microorganisms under suitable conditions (such as those described above) and analyzing the medium and/or the cellular components for the increased production of the amino acid. Such analytical
15 techniques are well known to the skilled worker and encompass spectroscopy, thin-layer chromatography, various types of staining methods, enzymatic and microbiological methods and analytical chromatography such as high-performance liquid chromatography (see, for example, Ullman, Encyclopedia of Industrial Chemistry, Vol. A2, pp. 89-90 and pp. 443-613, VCH: Weinheim (1985); Fallon, A., et al., (1987) "Applications of HPLC in Biochemistry" in: Laboratory Techniques in Biochemistry and
20 Molecular Biology, Vol. 17; Rehm et al. (1993) Biotechnology, Vol. 3, Chapter III: "Product recovery and purification", pp. 469-714, VCH: Weinheim; Belter, P.A. et al. (1988) Bioseparations: downstream processing for Biotechnology, John Wiley and Sons; Kennedy, J.F. and Cabral, J.M.S. (1992) Recovery processes for biological Materials, John Wiley and Sons; Shaeiwitz, J.A. and Henry, J.D. (1988) Biochemical
25 Separations, in Ullmann's Encyclopedia of Industrial Chemistry, Vol. B3; chapter 11, pp. 1-27, VCH: Weinheim; and Dechow, F.J. (1989) Separation and purification techniques in biotechnology, Noyes Publications).

- [0471.0.0.0]** In addition to the determination of the fermentation end product, other components of the metabolic pathways which are used for the production of the
30 desired compound, such as intermediates and by-products, may also be analyzed in order to determine the total productivity of the organism, the yield and/or production efficiency of the compound. The analytical methods encompass determining the amounts of nutrients in the medium (for example sugars, hydrocarbons, nitrogen sources, phosphate and other ions), determining biomass composition and growth,
35 analyzing the production of ordinary metabolites from biosynthetic pathways and measuring gases generated during the fermentation. Standard methods for these are described in Applied Microbial Physiology; A Practical Approach, P.M. Rhodes and P.F. Stanbury, Ed. IRL Press, pp. 103-129; 131-163 and 165-192 (ISBN: 0199635773) and the references cited therein.

[0472.0.0.0] Example 9: Purification of the amino acid

[0473.0.0.0] The amino acid can be recovered from cells or from the supernatant of the above-described culture by a variety of methods known in the art. For example, the culture supernatant is recovered first. To this end, the cells are harvested from the culture by slow centrifugation. Cells can generally be disrupted or lysed by standard techniques such as mechanical force or sonication. The cell debris is removed by centrifugation and the supernatant fraction, if appropriate together with the culture supernatant, is used for the further purification of the amino acid. However, it is also possible to process the supernatant alone if the amino acid is present in the supernatant in sufficiently high a concentration. In this case, the amino acid, or the amino acid mixture, can be purified further for example via extraction and/or salt precipitation or via ion-exchange chromatography.

[0474.0.0.0] If required and desired, further chromatography steps with a suitable resin may follow, the amino acid, but not many contaminants in the sample, being retained on the chromatography resin or the contaminants, but not the sample with the product (amino acid), being retained on the resin. If necessary, these chromatography steps may be repeated, using identical or other chromatography resins. The skilled worker is familiar with the selection of suitable chromatography resin and the most effective use for a particular molecule to be purified. The purified product can be concentrated by filtration or ultrafiltration and stored at a temperature at which maximum product stability is ensured. Many purification methods, which are not limited to the above purification method are known in the art. They are described, for example, in Bailey, J.E. & Ollis, D.F. Biochemical Engineering Fundamentals, McGraw-Hill: New York (1986).

[0475.0.0.0] Identity and purity of the amino acid isolated can be determined by standard techniques of the art. They encompass high-performance liquid chromatography (HPLC), spectroscopic methods, mass spectrometry (MS), staining methods, thin-layer chromatography, NIRS, enzyme assay or microbiological assays. These analytical methods are compiled in: Patek et al. (1994) Appl. Environ. Microbiol. 60: 133-140; Malakhova et al. (1996) Biotekhnologiya 11: 27-32; and Schmidt et al. (1998) Bioprocess Engineer. 19: 67-70. Ulmann's Encyclopedia of Industrial Chemistry (1996) Vol. A27, VCH: Weinheim, pp. 89-90, pp. 521-540, pp. 540-547, pp. 559-566, 575-581 and pp. 581-587; Michal, G (1999) Biochemical Pathways: An Atlas of Biochemistry and Molecular Biology, John Wiley and Sons; Fallon, A. et al. (1987) Applications of HPLC in Biochemistry in: Laboratory Techniques in Biochemistry and Molecular Biology, Vol. 17.

[0476.0.0.0] Example 10: Cloning SEQ ID NO: 1 for the expression in plants

[0477.0.0.0] Unless otherwise specified, standard methods as described in Sambrook et al., Molecular Cloning: A laboratory manual, Cold Spring Harbor 1989, Cold Spring Harbor Laboratory Press are used.

5 [0478.0.0.0] SEQ ID NO: 1 is amplified by PCR as described in the protocol of the Pfu Turbo or DNA Herculanase polymerase (Stratagene).

[0479.0.0.0] The composition for the protocol of the *Pfu* Turbo DNA polymerase was as follows: 1x PCR buffer (Stratagene), 0.2 mM of each dNTP, 100 ng genomic DNA of *Saccharomyces cerevisiae* (strain S288C; Research Genetics, Inc., now Invitrogen) or
10 *Escherichia coli* (strain MG1655; *E.coli* Genetic Stock Center), 50 pmol forward primer, 50 pmol reverse primer, 2.5 u *Pfu* Turbo DNA polymerase. The amplification cycles were as follows:

1 cycle of 3 minutes at 94-95°C, followed by 25-36 cycles of in each case 1 minute at 95°C or 30 seconds at 94°C, 45 seconds at 50°C, 30 seconds at 50°C or 30 seconds
15 at 55°C and 210-480 seconds at 72°C, followed by 1 cycle of 8 minutes at 72°C, then 4°C.

[0480.0.0.0] The composition for the protocol of the Herculanase polymerase was as follows: 1x PCR buffer (Stratagene), 0.2 mM of each dNTP, 100 ng genomic DNA of *Saccharomyces cerevisiae* (strain S288C; Research Genetics, Inc., now Invitrogen) or
20 *Escherichia coli* (strain MG1655; *E.coli* Genetic Stock Center), 50 pmol forward primer, 50 pmol reverse primer, 2.5 u Herculanase polymerase. The amplification cycles were as follows:

[0481.0.0.0] 1 cycle of 2-3 minutes at 94°C, followed by 25-30 cycles of in each case 30 seconds at 94°C, 30 seconds at 55-60°C and 5-10 minutes at 72°C, followed by 1
25 cycle of 10 minutes at 72°C, then 4°C.

[0482.0.0.0] The following primer sequences were selected for the gene SEQ ID NO: 1:

i) forward primer (SEQ ID NO: 53)
5'-ATGTCTGAAAAGGCCGTTAGAAGG-3'

30 ii) reverse primer (SEQ ID NO: 54)
5'-TTATAAAATTATGCAACAGTTAGCCC-3'

[0483.0.0.0] Thereafter, the amplificate was purified over QIAquick columns following the standard protocol (Qiagen).

5 [0484.0.0.0] For the cloning of PCR-products, produced by *Pfu* Turbo DNA polymerase, the vector DNA (30 ng) was restricted with *Sma*I following the standard protocol (MBI Fermentas) and stopped by addition of high-salt buffer. The restricted vector fragments were purified via Nucleobond columns using the standard protocol (Macherey-Nagel). Thereafter, the linearized vector was dephosphorylated following the standard protocol (MBI Fermentas).

[0485.0.0.0] The PCR-products, produced by *Pfu* Turbo DNA polymerase, were directly cloned into the processed binary vector.

10 [0486.0.0.0] The DNA termini of the PCR-products, produced by Herculase DNA polymerase, were blunted in a second synthesis reaction using *Pfu* Turbo DNA polymerase. The composition for the protocol of the blunting the DNA-termini was as follows: 0.2 mM blunting dTTP and 1.25 u *Pfu* Turbo DNA polymerase. The reaction was incubated at 72°C for 30 minutes. Then the PCR-products were cloned into the processed vector as well.

15 [0487.0.0.0] A binary vector comprising a selection cassette (promoter, selection marker, terminator) and an expression cassette with promoter, cloning cassette and terminator sequence between the T-DNA border sequences was used. In addition to those within the cloning cassette, the binary vector has no *Sma*I cleavage site. Binary vectors which can be used are known to the skilled worker; an overview of binary
20 vectors and their use can be found in Hellens, R., Mullineaux, P. and Klee H., [(2000) "A guide to *Agrobacterium* binary vectors", Trends in Plant Science, Vol. 5 No.10, 446–451. Depending on the vector used, cloning may advantageously also be carried out via other restriction enzymes. Suitable advantageous cleavage sites can be added to the ORF by using suitable primers for the PCR amplification.

25 [0488.0.0.0] Approximately 30 ng of prepared vector and a defined amount of prepared amplificate were mixed and ligated by addition of ligase.

[0489.0.0.0] The ligated vectors were transformed in the same reaction vessel by addition of competent *E. coli* cells (strain DH5alpha) and incubation for 20 minutes at 1°C followed by a heat shock for 90 seconds at 42°C and cooling to 4°C. Then,
30 complete medium (SOC) was added and the mixture was incubated for 45 minutes at 37°C. The entire mixture was subsequently plated onto an agar plate with antibiotics (selected as a function of the binary vector used) and incubated overnight at 37°C.

[0490.0.0.0] The outcome of the cloning step was verified by amplification with the aid of primers which bind upstream and downstream of the integration site, thus
35 allowing the amplification of the insertion. In addition combinations of the above mentioned gene specific primers and upstream and downstream primers were used in PCR reactions to identify clones with the correct insert orientation. The amplifications were carried as described in the protocol of *Taq* DNA polymerase (Gibco-BRL).

[0491.0.0.0] The amplification cycles were as follows: 1 cycle of 5 minutes at 94°C, followed by 35 cycles of in each case 15 seconds at 94°C, 15 seconds at 50-66°C and 5 minutes at 72°C, followed by 1 cycle of 10 minutes at 72°C, then 4°C.

5 [0492.0.0.0] Several colonies were checked, but only one colony for which a PCR product of the expected size was detected was used in the following steps.

[0493.0.0.0] A portion of this positive colony was transferred into a reaction vessel filled with complete medium (LB) and incubated overnight at 37°C. The LB medium contained an antibiotic chosen to suit the binary vector (see above) used and the resistance gene present therein in order to select the clone.

10 [0494.0.0.0] The plasmid preparation was carried out as specified in the Qiaprep standard protocol (Qiagen).

[0495.0.0.0] Example 11: Generation of transgenic plants which express
SEQ ID NO: 1

15 [0496.0.0.0] 1 ng of the plasmid DNA isolated was transformed by electroporation into competent cells of *Agrobacterium tumefaciens*, of strain GV 3101 pMP90 (Koncz and Schell, Mol. Gen. Gent. 204, 383-396, 1986). The choice of the agrobacterial strain depends on the choice of the binary vector. An overview of possible strains and their properties is found in Hellens, R., Mullineaux, P. and Klee H., (2000) "A guide to *Agrobacterium* binary vectors, Trends in Plant Science, Vol. 5 No.10, 446-451.

20 Thereafter, complete medium (YEP) was added and the mixture was transferred into a fresh reaction vessel for 3 hours at 28°C. Thereafter, all of the reaction mixture was plated onto YEP agar plates supplemented with the respective antibiotics, for example rifampicin and gentamycin for GV3101 pMP90, and a further antibiotic for the selection onto the binary vector, was plated, and incubated for 48 hours at 28°C.

25 [0497.0.0.0] The agrobacteria generated in Example 10, which contains the plasmid construct were then used for the transformation of plants.

[0498.0.0.0] A colony was picked from the agar plate with the aid of a pipette tip and taken up in 3 ml of liquid TB medium, which also contained suitable antibiotics, depending on the agrobacterial strain and the binary plasmid. The preculture was
30 grown for 48 hours at 28°C and 120 rpm.

[0499.0.0.0] 400 ml of LB medium containing the same antibiotics as above were used for the main culture. The preculture was transferred into the main culture. It was grown for 18 hours at 28°C and 120 rpm. After centrifugation at 4 000 rpm, the pellet was resuspended in infiltration medium (MS medium, 10% sucrose).

35 [0500.0.0.0] In order to grow the plants for the transformation, dishes (Piki Saat 80, green, provided with a screen bottom, 30 x 20 x 4.5 cm, from Wiesauplast,

- Kunststofftechnik, Germany) were half-filled with a GS 90 substrate (standard soil, Werkverband E.V., Germany). The dishes were watered overnight with 0.05% Proplant solution (Chimac-Apriphar, Belgium). *Arabidopsis thaliana* C24 seeds (Nottingham Arabidopsis Stock Centre, UK ; NASC Stock N906) were scattered over the dish, approximately 1 000 seeds per dish. The dishes were covered with a hood and placed in the stratification facility (8 h, 110 $\mu\text{mol/m}^2/\text{s}^{-1}$, 22°C; 16 h, dark, 6°C). After 5 days, the dishes were placed into the short-day controlled environment chamber (8 h 130 $\mu\text{mol/m}^2/\text{s}^{-1}$, 22°C; 16 h, dark 20°C), where they remained for approximately 10 days until the first true leaves had formed.
- 10 **[0501.0.0.0]** The seedlings were transferred into pots containing the same substrate (Teku pots, 7 cm, LC series, manufactured by Pöppelmann GmbH & Co, Germany). Five plants were pricked out into each pot. The pots were then returned into the short-day controlled environment chamber for the plant to continue growing.
- 15 **[0502.0.0.0]** After 10 days, the plants were transferred into the greenhouse cabinet (supplementary illumination, 16 h, 340 μE , 22°C; 8 h, dark, 20°C), where they were allowed to grow for further 17 days.
- 20 **[0503.0.0.0]** For the transformation, 6-week-old *Arabidopsis* plants which had just started flowering were immersed for 10 seconds into the above-described agrobacterial suspension which had previously been treated with 10 μl Silwett L77 (Crompton S.A., Osi Specialties, Switzerland). The method in question is described in Clough and Bent, 1998 (Clough, JC and Bent, AF. 1998 Floral dip: a simplified method for *Agrobacterium*-mediated transformation of *Arabidopsis thaliana*, Plant J. 16:735-743.
- 25 **[0504.0.0.0]** The plants were subsequently placed for 18 hours into a humid chamber. Thereafter, the pots were returned to the greenhouse for the plants to continue growing. The plants remained in the greenhouse for another 10 weeks until the seeds were ready for harvesting.
- 30 **[0505.0.0.0]** Depending on the resistance marker used for the selection of the transformed plants the harvested seeds were planted in the greenhouse and subjected to a spray selection or else first sterilized and then grown on agar plates supplemented with the respective selection agent. In case of BASTA®-resistance, plantlets were sprayed four times at an interval of 2 to 3 days with 0.02 % BASTA® and transformed plants were allowed to set seeds. The seeds of the transgenic *A. thaliana* plants were stored in the freezer (at -20°C).
- [0506.0.0.0]** Example 12: Plant culture for bioanalytical analyses
- 35 **[0507.0.0.0]** For the bioanalytical analyses of the transgenic plants, the latter were grown uniformly at a specific culture facility. To this end the GS-90 substrate as the compost mixture was introduced into the potting machine (Laible System GmbH,

Singen, Germany) and filled into the pots. Thereafter, 35 pots were combined in one dish and treated with Previcur. For the treatment, 25 ml of Previcur were taken up in 10 l of tap water. This amount was sufficient for the treatment of approximately 200 pots. The pots were placed into the Previcur solution and additionally irrigated overhead with tap water without Previcur. They were used within four days. .

[0508.0.0.0] For the sowing, the seeds, which had been stored in the refrigerator (at -20°C), were removed from the Eppendorf tubes with the aid of a toothpick and transferred into the pots with the compost. In total, approximately 5 to 12 seeds were distributed in the middle of the pot.

10 [0509.0.0.0] After the seeds had been sown, the dishes with the pots were covered with matching plastic hood and placed into the stratification chamber for 4 days in the dark at 4°C. The humidity was approximately 90%. After the stratification, the test plants were grown for 22 to 23 days at a 16-h-light, 8-h-dark rhythm at 20°C, an atmospheric humidity of 60% and a CO₂ concentration of approximately 400 ppm. The light sources used were Powerstar HQI-T 250 W/D Daylight lamps from Osram, which generate a light resembling the solar color spectrum with a light intensity of approximately 220 µE/m²/s-1.

[0510.0.0.0] When the plants were 8, 9 and 10 days old, they were subjected to selection for the resistance marker. Approximately 1400 pots with transgenic plants were treated with 1l 0,015% vol/vol of Basta® (Glufosinate-ammonium) solution in water (Aventis Cropsience, Germany). After a further 3 to 4 days, the transgenic, resistant seedlings (plantlets in the 4-leaf stage) could be distinguished clearly from the untransformed plantlets. The nontransgenic seedlings were bleached or dead. The transgenic resistance plants were thinned when they had reached the age of 14 days. The plants, which had grown best in the center of the pot were considered the target plants. All the remaining plants were removed carefully with the aid of metal tweezers and discarded.

[0511.0.0.0] During their growth, the plants received overhead irrigation with distilled water (onto the compost) and bottom irrigation into the placement grooves. Once the grown plants had reached the age of 23 days, they were harvested.

[0512.0.0.0] Example 13: Metabolic analysis of transformed plants

[0513.0.0.0] The modifications identified in accordance with the invention, in the content of above-described metabolites, were identified by the following procedure.

a) sampling and storage of the samples

35 [0514.0.0.0] Sampling was performed directly in the controlled-environment chamber. The plants were cut using small laboratory scissors, rapidly weighed on

laboratory scales, transferred into a pre-cooled extraction sleeve and placed into an aluminum rack cooled by liquid nitrogen. If required, the extraction sleeves can be stored in the freezer at -80°C. The time elapsing between cutting the plant to freezing it in liquid nitrogen amounted to not more than 10 to 20 seconds.

5 b) Lyophilization

[0515.0.0.0] During the experiment, care was taken that the plants either remained in the deep-frozen state (temperatures < -40°C) or were freed from water by lyophilization until the first contact with solvents.

10 [0516.0.0.0] The aluminum rack with the plant samples in the extraction sleeves was placed into the pre-cooled (-40°C) lyophilization facility. The initial temperature during the main drying phase was -35°C and the pressure was 0.120 mbar. During the drying phase, the parameters were altered following a pressure and temperature program. The final temperature after 12 hours was +30°C and the final pressure was 0.001 to 0.004 mbar. After the vacuum pump and the refrigerating machine had been
15 switched off, the system was flushed with air (dried via a drying tube) or argon.

 c) Extraction

[0517.0.0.0] Immediately after the lyophilization apparatus had been flushed, the extraction sleeves with the lyophilized plant material were transferred into the 5 ml extraction cartridges of the ASE device (Accelerated Solvent Extractor ASE 200 with
20 Solvent Controller and AutoASE software (DIONEX)).

[0518.0.0.0] The 24 sample positions of an ASE device (Accelerated Solvent Extractor ASE 200 with Solvent Controller and AutoASE software (DIONEX)) were filled with plant samples, including some samples for testing quality control.

25 [0519.0.0.0] The polar substances were extracted with approximately 10 ml of methanol/water (80/20, v/v) at T = 70°C and p = 140 bar, 5 minutes heating-up phase, 1 minute static extraction. The more lipophilic substances were extracted with approximately 10 ml of methanol/dichloromethane (40/60, v/v) at T = 70°C and p = 140 bar, 5 minute heating-up phase, 1 minute static extraction. The two solvent mixtures were extracted into the same glass tubes (centrifuge tubes, 50 ml, equipped
30 with screw cap and pierceable septum for the ASE (DIONEX)).

[0520.0.0.0] The solution was treated with internal standards: ribitol, L-glycine-2,2-d₂, L-alanine-2,3,3,3-d₄, methionine-methyl-d₃, and α-methylglucopyranoside and methyl nonadecanoate, methyl undecanoate, methyl tridecanoate, methyl pentadecanoate, methyl nonacosanoate.

35 [0521.0.0.0] The total extract was treated with 8 ml of water. The solid residue of the plant sample and the extraction sleeve were discarded.

[0522.0.0.0] The extract was shaken and then centrifuged for 5 to 10 minutes at at least 1 400 g in order to accelerate phase separation. 1 ml of the supernatant methanol/water phase ("polar phase", colorless) was removed for the further GC analysis, and 1 ml was removed for the LC analysis. The remainder of the
5 methanol/water phase was discarded. 0.5 ml of the organic phase ("lipid phase", dark green) was removed for the further GC analysis and 0.5 ml was removed for the LC analysis. All the portions removed were evaporated to dryness using the IR Dancer infrared vacuum evaporator (Hettich). The maximum temperature during the evaporation process did not exceed 40°C. Pressure in the apparatus was not less than
10 10 mbar.

d) Processing the lipid phase for the LC/MS or LC/MS/MS analysis

[0523.0.0.0] The lipid extract, which had been evaporated to dryness was taken up in mobile phase. The HPLC was run with gradient elution.

15 [0524.0.0.0] The polar extract, which had been evaporated to dryness was taken up in mobile phase. The HPLC was run with gradient elution.

e) Derivatization of the lipid phase for the GC/MS analysis

[0525.0.0.0] For the transmethanolysis, a mixture of 140 µl of chloroform, 37 µl of
20 hydrochloric acid (37% by weight HCl in water), 320 µl of methanol and 20 µl of toluene was added to the evaporated extract. The vessel was sealed tightly and heated for 2 hours at 100°C, with shaking. The solution was subsequently evaporated to dryness. The residue was dried completely.

[0526.0.0.0] The methoximation of the carbonyl groups was carried out by reaction
25 with methoxyamine hydrochloride (5 mg/ml in pyridine, 100 µl for 1.5 hours at 60°C) in a tightly sealed vessel. 20 µl of a solution of odd-numbered, straight-chain fatty acids (solution of each 0.3 mg/mL of fatty acids from 7 to 25 carbon atoms and each 0.6 mg/mL of fatty acids with 27, 29 and 31 carbon atoms in 3/7 (v/v) pyridine/toluene) were added as time standards. Finally, the derivatization with 100 µl of N-methyl-N-
30 (trimethylsilyl)-2,2,2-trifluoroacetamide (MSTFA) was carried out for 30 minutes at 60°C, again in the tightly sealed vessel. The final volume before injection into the GC was 220 µl.

f) Derivatization of the polar phase for the GC/MS analysis

35 [0527.0.0.0] The methoximation of the carbonyl groups was carried out by reaction with methoxyamine hydrochloride (5 mg/ml in pyridine, 50 µl for 1.5 hours at 60°C) in a

tightly sealed vessel. 10 µl of a solution of odd-numbered, straight-chain fatty acids (solution of each 0.3 mg/mL of fatty acids from 7 to 25 carbon atoms and each 0.6 mg/mL of fatty acids with 27, 29 and 31 carbon atoms in 3/7 (v/v) pyridine/toluene) were added as time standards. Finally, the derivatization with 50 µl of N-methyl-N-
5 (trimethylsilyl)-2,2,2-trifluoroacetamide (MSTFA) was carried out for 30 minutes at 60°C, again in the tightly sealed vessel. The final volume before injection into the GC was 110 µl.

g) Analysis of the various plant samples

10 [0528.0.0.0] The samples were measured in individual series of 20 plant samples each (also referred to as sequences), each sequence containing at least 5 wild-type plants as controls. The peak area of each analyte was divided by the peak area of the respective internal standard. The data were standardized for the fresh weight established for the plant. The values calculated thus were related to the wild-type control group by being divided by the mean of the corresponding data of the wild-type
15 control group of the same sequence. The values obtained were referred to as ratio_by_WT, they are comparable between sequences and indicate how much the analyte concentration in the mutant differs in relation to the wild-type control. Appropriate controls were done before to proof that the vector and transformation procedure itself has no significant influence on the metabolic composition of the plants.
20 Therefore the described changes in comparison with wildtypes were caused by the introduced genes.

[0529.0.0.0] As an alternative, the amino acids can be detected advantageously via HPLC separation in ethanolic extract as described by Geigenberger et al. (Plant Cell & Environ, 19, 1996: 43–55).

25 The results of the different plant analyses can be seen from the table 1.

[0530.0.0.0] Column 1 in Table 1 shows the amino acid analyzed. Columns 3 and 4 shows the ratio of the analyzed amino acid between the transgenic plants and the wild type; Increase of the metabolites: Max: maximal x-fold (normalised to wild type)-Min: minimal x-fold (normalised to wild type). Decrease of the metabolites: Max: maximal x-
30 fold (normalised to wild type) (minimal decrease), Min: minimal x-fold (normalised to wild type) (maximal decrease). Column 2 indicates the analytical method.

[0531.0.0.0] When the analyses were repeated independently, all results proved to be significant.

[0532.0.0.0] Example 14a: Engineering ryegrass plants by over-expressing YNL090W, e.g. from *Saccharomyces cerevisiae* or plants

[0533.0.0.0] Seeds of several different ryegrass varieties can be used as explant sources for transformation, including the commercial variety Gunne available from Svalof Weibull seed company or the variety Affinity. Seeds are surface-sterilized sequentially with 1% Tween-20 for 1 minute, 100 % bleach for 60 minutes, 3 rinses with 5 minutes each with de-ionized and distilled H₂O, and then germinated for 3-4 days on moist, sterile filter paper in the dark. Seedlings are further sterilized for 1 minute with 1% Tween-20, 5 minutes with 75% bleach, and rinsed 3 times with ddH₂O, 5 min each.

[0534.0.0.0] Surface-sterilized seeds are placed on the callus induction medium containing Murashige and Skoog basal salts and vitamins, 20 g/l sucrose, 150 mg/l asparagine, 500 mg/l casein hydrolysate, 3 g/l Phytigel, 10 mg/l BAP, and 5 mg/l dicamba. Plates are incubated in the dark at 25°C for 4 weeks for seed germination and embryogenic callus induction.

[0535.0.0.0] After 4 weeks on the callus induction medium, the shoots and roots of the seedlings are trimmed away, the callus is transferred to fresh media, is maintained in culture for another 4 weeks, and is then transferred to MSO medium in light for 2 weeks. Several pieces of callus (11-17 weeks old) are either strained through a 10 mesh sieve and put onto callus induction medium, or are cultured in 100 ml of liquid ryegrass callus induction media (same medium as for callus induction with agar) in a 250 ml flask. The flask is wrapped in foil and shaken at 175 rpm in the dark at 23°C for 1 week. Sieving the liquid culture with a 40-mesh sieve is collected the cells. The fraction collected on the sieve is plated and is cultured on solid ryegrass callus induction medium for 1 week in the dark at 25°C. The callus is then transferred to and is cultured on MS medium containing 1% sucrose for 2 weeks.

[0536.0.0.0] Transformation can be accomplished with either *Agrobacterium* or with particle bombardment methods. An expression vector is created containing a constitutive plant promoter and the cDNA of the gene in a pUC vector. The plasmid DNA is prepared from *E. coli* cells using with Qiagen kit according to manufacturer's instruction. Approximately 2 g of embryogenic callus is spread in the center of a sterile filter paper in a Petri dish. An aliquot of liquid MSO with 10 g/l sucrose is added to the filter paper. Gold particles (1.0 µm in size) are coated with plasmid DNA according to method of Sanford et al., 1993 and are delivered to the embryogenic callus with the following parameters: 500 µg particles and 2 µg DNA per shot, 1300 psi and a target distance of 8.5 cm from stopping plate to plate of callus and 1 shot per plate of callus.

[0537.0.0.0] After the bombardment, calli are transferred back to the fresh callus development medium and maintained in the dark at room temperature for a 1-week

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[0539.0.0.0] Transgenic T0 ryegrass plants are propagated vegetatively by excising tillers. The transplanted tillers are maintained in the greenhouse for 2 months until well established. The shoots are defoliated and allowed to grow for 2 weeks.

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promoters can be used to regulate the trait gene to provide constitutive, developmental, tissue or environmental regulation of gene transcription as described above. In this example, the 34S promoter (GenBank Accession numbers M59930 and X16673) is used to provide constitutive expression of the trait gene.

- 5 **[0543.0.0.0]** After the co-cultivation treatment, the explants are washed and transferred to selection media supplemented with 500 mg/L timentin. Shoots are excised and placed on a shoot elongation medium. Shoots longer than 1 cm are placed on rooting medium for two to four weeks prior to transplanting to soil.

- 10 **[0544.0.0.0]** The primary transgenic plants (T0) are analyzed by PCR to confirm the presence of T-DNA. These results are confirmed by Southern hybridization in which DNA is electrophoresed on a 1 % agarose gel and transferred to a positively charged nylon membrane (Roche Diagnostics). The PCR DiG Probe Synthesis Kit (Roche Diagnostics) is used to prepare a digoxigenin-labelled probe by PCR, and is used as recommended by the manufacturer.

- 15 **[0545.0.0.0]** Example 14c: Engineering corn plants by over-expressing YNL090W, e.g. from *Saccharomyces cerevisiae* or plants

- [0546.0.0.0]** Transformation of maize (*Zea Mays* L.) is performed with a modification of the method described by Ishida et al. (1996. *Nature Biotech* 14745-50). Transformation is genotype-dependent in corn and only specific genotypes are
20 amenable to transformation and regeneration. The inbred line A188 (University of Minnesota) or hybrids with A188 as a parent are good sources of donor material for transformation (Fromm et al. 1990 *Biotech* 8:833-839), but other genotypes can be used successfully as well. Ears are harvested from corn plants at approximately 11 days after pollination (DAP) when the length of immature embryos is about 1 to 1.2
25 mm. Immature embryos are co-cultivated with *Agrobacterium tumefaciens* that carry "super binary" vectors and transgenic plants are recovered through organogenesis. The super binary vector system of Japan Tobacco is described in WO patents WO94/00977 and WO95/06722. Vectors can be constructed as described. Various selection marker genes can be used including the maize gene encoding a mutated
30 acetohydroxy acid synthase (AHAS) enzyme (US patent 6025541). Similarly, various promoters can be used to regulate the trait gene to provide constitutive, developmental, tissue or environmental regulation of gene transcription. In this example, the 34S promoter (GenBank Accession numbers M59930 and X16673) is used to provide constitutive expression of the trait gene.

- 35 **[0547.0.0.0]** Excised embryos are grown on callus induction medium, then maize regeneration medium, containing imidazolinone as a selection agent. The Petri plates are incubated in the light at 25 °C for 2-3 weeks, or until shoots develop. The green shoots are transferred from each embryo to maize rooting medium and incubated at 25

°C for 2-3 weeks, until roots develop. The rooted shoots are transplanted to soil in the greenhouse. T1 seeds are produced from plants that exhibit tolerance to the imidazolinone herbicides and which are PCR positive for the transgenes.

5 **[0548.0.0.0]** The T1 generation of single locus insertions of the T-DNA can segregate for the transgene in a 3:1 ratio. Those progeny containing one or two copies of the transgene are tolerant of the imidazolinone herbicide. Homozygous T2 plants can exhibited similar phenotypes as the T1 plants. Hybrid plants (F1 progeny) of homozygous transgenic plants and non-transgenic plants can also exhibited increased similar phenotyps.

10 **[0549.0.0.0]** Example 14d: Engineering wheat plants by over-expressing YNL090W, e.g. from *Saccharomyces cerevisiae* or plants

15 **[0550.0.0.0]** Transformation of wheat is performed with the method described by Ishida et al. (1996 Nature Biotech. 14745-50). The cultivar Bobwhite (available from CYMMIT, Mexico) is commonly used in transformation. Immature embryos are co-cultivated with *Agrobacterium tumefaciens* that carry "super binary" vectors, and transgenic plants are recovered through organogenesis. The super binary vector system of Japan Tobacco is described in WO patents WO94/00977 and WO95/06722. Vectors were constructed as described. Various selection marker genes can be used including the maize gene encoding a mutated acetohydroxy acid synthase (AHAS) enzyme (US patent 6025541). Similarly, various promoters can be used to regulate the trait gene to provide constitutive, developmental, tissue or environmental regulation of gene transcription. In this example, the 34S promoter (GenBank Accession numbers M59930 and X16673) can be used to provide constitutive expression of the trait gene.

25 **[0551.0.0.0]** After incubation with *Agrobacterium*, the embryos are grown on callus induction medium, then regeneration medium, containing imidazolinone as a selection agent. The Petri plates are incubated in the light at 25 °C for 2-3 weeks, or until shoots develop. The green shoots are transferred from each embryo to rooting medium and incubated at 25 °C for 2-3 weeks, until roots develop. The rooted shoots are transplanted to soil in the greenhouse. T1 seeds are produced from plants that exhibit tolerance to the imidazolinone herbicides and which are PCR positive for the transgenes.

35 **[0552.0.0.0]** The T1 generation of single locus insertions of the T-DNA can segregate for the transgene in a 3:1 ratio. Those progeny containing one or two copies of the transgene are tolerant of the imidazolinone herbicide. Homozygous T2 plants exhibited similar phenotypes.

[0553.0.0.0] Example 14e: Engineering Rapeseed/Canola plants by over-expressing YNL090W, e.g. from *Saccharomyces cerevisiae* or plants

5 [0554.0.0.0] Cotyledonary petioles and hypocotyls of 5-6 day-old young seedlings are used as explants for tissue culture and transformed according to Babic et al. (1998, Plant Cell Rep 17: 183-188). The commercial cultivar Westar (Agriculture Canada) is the standard variety used for transformation, but other varieties can be used.

10 [0555.0.0.0] *Agrobacterium tumefaciens* LBA4404 containing a binary vector are used for canola transformation. Many different binary vector systems have been described for plant transformation (e.g. An, G. in *Agrobacterium Protocols. Methods in Molecular Biology* vol 44, pp 47-62, Gartland KMA and MR Davey eds. Humana Press, Totowa, New Jersey). Many are based on the vector pBIN19 described by Bevan (Nucleic Acid Research. 1984. 12:8711-8721) that includes a plant gene expression cassette flanked by the left and right border sequences from the Ti plasmid of

15 *Agrobacterium tumefaciens*. A plant gene expression cassette consists of at least two genes – a selection marker gene and a plant promoter regulating the transcription of the cDNA or genomic DNA of the trait gene. Various selection marker genes can be used including the *Arabidopsis* gene encoding a mutated acetohydroxy acid synthase (AHAS) enzyme (US patents 57673666 and 6225105). Similarly, various promoters can be used to regulate the trait gene to provide constitutive, developmental, tissue or

20 environmental regulation of gene transcription. In this example, the 34S promoter (GenBank Accession numbers M59930 and X16673) can be used to provide constitutive expression of the trait gene.

[0556.0.0.0] Canola seeds are surface-sterilized in 70% ethanol for 2 min., and then in 30% Clorox with a drop of Tween-20 for 10 min, followed by three rinses with

25 sterilized distilled water. Seeds are then germinated in vitro 5 days on half strength MS medium without hormones, 1% sucrose, 0.7% Phytagar at 23°C, 16 hr. light. The cotyledon petiole explants with the cotyledon attached are excised from the in vitro seedlings, and are inoculated with *Agrobacterium* by dipping the cut end of the petiole explant into the bacterial suspension. The explants are then cultured for 2 days on

30 MSBAP-3 medium containing 3 mg/l BAP, 3 % sucrose, 0.7 % Phytagar at 23 °C, 16 hr light. After two days of co-cultivation with *Agrobacterium*, the petiole explants are transferred to MSBAP-3 medium containing 3 mg/l BAP, cefotaxime, carbenicillin, or timentin (300 mg/l) for 7 days, and then cultured on MSBAP-3 medium with cefotaxime, carbenicillin, or timentin and selection agent until shoot regeneration. When the shoots

35 are 5 – 10 mm in length, they are cut and transferred to shoot elongation medium (MSBAP-0.5, containing 0.5 mg/l BAP). Shoots of about 2 cm in length are transferred to the rooting medium (MS0) for root induction.

[0557.0.0.0] Samples of the primary transgenic plants (T0) are analyzed by PCR to confirm the presence of T-DNA. These results are confirmed by Southern hybridization

in which DNA is electrophoresed on a 1 % agarose gel and are transferred to a positively charged nylon membrane (Roche Diagnostics). The PCR DIG Probe Synthesis Kit (Roche Diagnostics) is used to prepare a digoxigenin-labelled probe by PCR, and used as recommended by the manufacturer.

- 5 **[0558.0.0.0]** Example 14f: Engineering alfalfa plants by over-expressing
YNL090W genes, e.g. from *Saccharomyces cerevisiae*
or *E. coli* or plants

[0559.0.0.0] A regenerating clone of alfalfa (*Medicago sativa*) is transformed using the method of (McKersie et al., 1999 Plant Physiol 119: 839–847). Regeneration and transformation of alfalfa is genotype dependent and therefore a regenerating plant is required. Methods to obtain regenerating plants have been described. For example, these can be selected from the cultivar Rangelander (Agriculture Canada) or any other commercial alfalfa variety as described by Brown DCW and A Atanassov (1985. Plant Cell Tissue Organ Culture 4: 111-112). Alternatively, the RA3 variety (University of Wisconsin) has been selected for use in tissue culture (Walker et al., 1978 Am J Bot 65:654-659).

[0560.0.0.0] Petiole explants are cocultivated with an overnight culture of *Agrobacterium tumefaciens* C58C1 pMP90 (McKersie et al., 1999 Plant Physiol 119: 839–847) or LBA4404 containing a binary vector. Many different binary vector systems have been described for plant transformation (e.g. An, G. in *Agrobacterium Protocols. Methods in Molecular Biology* vol 44, pp 47-62, Gartland KMA and MR Davey eds. Humana Press, Totowa, New Jersey). Many are based on the vector pBIN19 described by Bevan (Nucleic Acid Research. 1984. 12:8711-8721) that includes a plant gene expression cassette flanked by the left and right border sequences from the Ti plasmid of *Agrobacterium tumefaciens*. A plant gene expression cassette consists of at least two genes – a selection marker gene and a plant promoter regulating the transcription of the cDNA or genomic DNA of the trait gene. Various selection marker genes can be used including the Arabidopsis gene encoding a mutated acetohydroxy acid synthase (AHAS) enzyme (US patents 57673666 and 6225105). Similarly, various promoters can be used to regulate the trait gene that provides constitutive, developmental, tissue or environmental regulation of gene transcription. In this example, the 34S promoter (GenBank Accession numbers M59930 and X16673) can be used to provide constitutive expression of the trait gene.

[0561.0.0.0] The explants are cocultivated for 3 d in the dark on SH induction medium containing 288 mg/ L Pro, 53 mg/ L thioproline, 4.35 g/ L K₂SO₄, and 100 µm acetosyringinone. The explants are washed in half-strength Murashige-Skoog medium (Murashige and Skoog, 1962) and plated on the same SH induction medium without acetosyringinone but with a suitable selection agent and suitable antibiotic to inhibit *Agrobacterium* growth. After several weeks, somatic embryos are transferred to BOi2Y

development medium containing no growth regulators, no antibiotics, and 50 g/ L sucrose. Somatic embryos are subsequently germinated on half-strength Murashige-Skoog medium. Rooted seedlings are transplanted into pots and grown in a greenhouse.

- 5 **[0562.0.0.0]** The T0 transgenic plants are propagated by node cuttings and rooted in Turface growth medium. The plants are defoliated and grown to a height of about 10 cm (approximately 2 weeks after defoliation).

- 10 [0563.0.0.0] Example 14g: Engineering alfalfa plants by over-expressing
YLR375W genes, e.g. from *Saccharomyces cerevisiae*
or plants

- [0564.0.0.0]** A regenerating clone of alfalfa (*Medicago sativa*) is transformed using the method of (McKersie et al., 1999 Plant Physiol 119: 839–847). Regeneration and transformation of alfalfa is genotype dependent and therefore a regenerating plant is required. Methods to obtain regenerating plants have been described. For example, these can be selected from the cultivar Rangelander (Agriculture Canada) or any other commercial alfalfa variety as described by Brown DCW and A Atanassov (1985. Plant Cell Tissue Organ Culture 4: 111-112). Alternatively, the RA3 variety (University of Wisconsin) has been selected for use in tissue culture (Walker et al., 1978 Am J Bot 65:654-659).

- 20 [0565.0.0.0] Petiole explants are cocultivated with an overnight culture of
Agrobacterium tumefaciens C58C1 pMP90 (McKersie et al., 1999 Plant Physiol 119:
839–847) or LBA4404 containing a binary vector. Many different binary vector systems
have been described for plant transformation (e.g. An, G. in Agrobacterium Protocols.
Methods in Molecular Biology vol 44, pp 47-62, Gartland KMA and MR Davey eds.
25 Humana Press, Totowa, New Jersey). Many are based on the vector pBIN19 described
by Bevan (Nucleic Acid Research. 1984. 12:8711-8721) that includes a plant gene
expression cassette flanked by the left and right border sequences from the Ti plasmid
of Agrobacterium tumefaciens. A plant gene expression cassette consists of at least
two genes – a selection marker gene and a plant promoter regulating the transcription
30 of the cDNA or genomic DNA of the trait gene. Various selection marker genes can be
used including the Arabidopsis gene encoding a mutated acetohydroxy acid synthase
(AHAS) enzyme (US patents 57673666 and 6225105). Similarly, various promoters
can be used to regulate the trait gene that provides constitutive, developmental, tissue
or environmental regulation of gene transcription. In this example, the 34S promoter
35 (GenBank Accession numbers M59930 and X16673) can be used to provide
constitutive expression of the trait gene.

- [0566.0.0.0]** The explants are cocultivated for 3 d in the dark on SH induction medium containing 288 mg/ L Pro, 53 mg/ L thioproline, 4.35 g/ L K2SO4, and 100 μm

acetosyringinone. The explants are washed in half-strength Murashige-Skoog medium (Murashige and Skoog, 1962) and plated on the same SH induction medium without acetosyringinone but with a suitable selection agent and suitable antibiotic to inhibit *Agrobacterium* growth. After several weeks, somatic embryos are transferred to BOi2Y development medium containing no growth regulators, no antibiotics, and 50 g/ L sucrose. Somatic embryos are subsequently germinated on half-strength Murashige-Skoog medium. Rooted seedlings are transplanted into pots and grown in a greenhouse.

10 [0567.0.0.0] The T0 transgenic plants are propagated by node cuttings and rooted in Turface growth medium. The plants are defoliated and grown to a height of about 10 cm (approximately 2 weeks after defoliation).

[0568.0.0.0] Equivalents

15 [0569.0.0.0] Those of ordinary skill in the art will recognize, or will be able to ascertain using no more than routine experimentation, many equivalents to the specific embodiments of the invention described herein. Such equivalents are intended to be encompassed by the claims.

We claim:

1. A process for the production of fine chemical, which comprises

a) increasing or generating the biological activity represented by a protein as depicted in SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394 in a non-human organism, or in one or more parts thereof; and

b) growing the organism under conditions which permit the production of the fine chemical in said organism.

2. A process for the production of fine chemical, comprising the increasing or generating in an organism or a part thereof the expression of at least one nucleic acid molecule comprising a nucleic acid molecule selected from the group consisting of:

a) nucleic acid molecule encoding of the polypeptide as depicted in SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394 or a fragment thereof, which confers an increase in the amount of fine chemical in an organism or a part thereof;

- 5 b) nucleic acid molecule comprising of the nucleic acid molecule as depicted in
 SEQ ID NO: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35,
 37, 39, 41 43, 45, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83,
 85, 87, 89, 91, 93, 95, 97, 99, 101, 103, 105, 107, 109, 111, 113, 115, 117,
 119, 121, 123, 125, 127, 129, 131, 133, 135, 137, 139, 141, 143, 145, 147,
 149, 151, 153, 155, 157, 159, 161, 163, 165, 167, 169, 171, 173, 175, 177,
 179, 181, 183, 185, 187, 189, 191, 193, 195, 197, 199, 201, 203, 205, 207,
 209, 211, 213, 215, 217, 219, 221, 223, 225, 227, 229, 231, 233, 235, 237,
 239, 241, 243, 245, 247, 249, 251, 253, 255, 257, 259, 261, 263, 265, 267,
10 269, 271, 273, 275, 277, 279, 281, 283, 285, 287, 289, 291, 293, 295, 297,
 299, 301, 303, 305, 307, 309, 311, 313, 315, 317, 319, 321, 323, 325, 327,
 329, 331, 333, 335, 337, 339, 341, 343, 345, 347, 349, 351, 353, 355, 357,
 359, 361, 363, 365, 367, 369, 371, 373, 375, 377, 379, 381, 383, 385, 387,
 389, 391 or 393;
- 15 c) nucleic acid molecule whose sequence can be deduced from a polypeptide
 sequence encoded by a nucleic acid molecule of (a) or (b) as a result of the
 degeneracy of the genetic code and conferring an increase in the amount of
 fine chemical in an organism or a part thereof;
- 20 d) nucleic acid molecule which encodes a polypeptide which has at least 50%
 identity with the amino acid sequence of the polypeptide encoded by the
 nucleic acid molecule of (a) to (c) and conferring an increase in the amount
 of fine chemical in an organism or a part thereof;
- 25 e) nucleic acid molecule which hybridizes with a nucleic acid molecule of (a) to
 (c) under stringent hybridization conditions and conferring an increase in the
 amount of fine chemical in an organism or a part thereof;
- 30 f) nucleic acid molecule which encompasses a nucleic acid molecule which is
 obtained by amplifying nucleic acid molecules from a cDNA library or a
 genomic library using the primers in SEQ ID NO: 53 or SEQ ID NO: 54 and
 conferring an increase in the amount of the fine chemical in an organism or
 a part thereof;
- 35 g) nucleic acid molecule encoding a polypeptide which is isolated with the aid
 of monoclonal antibodies against a polypeptide encoded by one of the
 nucleic acid molecules of (a) to (f) and conferring an increase in the amount
 of fine chemical in an organism or a part thereof;
- h) nucleic acid molecule encoding a polypeptide comprising the consensus
 sequence as depicted in SEQ ID NO: 47, SEQ ID NO: 48, SEQ ID NO: 49,
 SEQ ID NO: 50, SEQ ID NO: 51, SEQ ID NO: 52, SEQ ID NO: 397, SEQ ID
 NO: 398, SEQ ID NO: 399 and/or SEQ ID NO: 400 and conferring an

increase in the amount of the fine chemical in an organism or a part thereof;
and

- 5 i) nucleic acid molecule which is obtainable by screening a suitable nucleic acid library under stringent hybridization conditions with a probe comprising one of the sequences of the nucleic acid molecule of (a) to (k) or with a fragment thereof having at least 15 nt, preferably 20 nt, 30 nt, 50 nt, 100 nt, 200 nt or 500 nt of the nucleic acid molecule characterized in (a) to (k) and conferring an increase in the amount of the fine chemical in an organism or a part thereof.

10 or comprising a sequence which is complementary thereto.

3. The process of claim 1 or 2, comprising recovering of the free or bound fine chemical.

4. The process of any one of claim 1 to 3, comprising the following steps:

- 15 (a) selecting an organism or a part thereof expressing a polypeptide encoded by the nucleic acid molecule characterized in claim 2;
- (b) mutagenizing the selected organism or the part thereof;
- (c) comparing the activity or the expression level of said polypeptide in the mutagenized organism or the part thereof with the activity or the expression of said polypeptide of the selected organisms or the part thereof;
- 20 (d) selecting the mutated organisms or parts thereof, which comprise an increased activity or expression level of said polypeptide compared to the selected organism or the part thereof;
- (e) optionally, growing and cultivating the organisms or the parts thereof; and
- 25 (f) recovering, and optionally isolating, the free or bound fine chemical produced by the selected mutated organisms or parts thereof.

5. The process of any one of claims 1 to 4, wherein the activity of said protein or the expression of said nucleic acid molecule is increased or generated transiently or stably.

30 6. An isolated nucleic acid molecule comprising a nucleic acid molecule selected from the group consisting of:

- (a) nucleic acid molecule encoding of the polypeptide as depicted in SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88,

- 5 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120,
122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150,
152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180,
182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210,
212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240,
242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270,
272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300,
302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330,
332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360,
10 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390,
392 or 394 or a fragment thereof, which confers an increase in the amount
of fine chemical in an organism or a part thereof;
- 15 (b) nucleic acid molecule comprising of the nucleic acid molecule as depicted in
SEQ ID NO: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35,
37, 39, 41, 43, 45, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83,
85, 87, 89, 91, 93, 95, 97, 99, 101, 103, 105, 107, 109, 111, 113, 115, 117,
119, 121, 123, 125, 127, 129, 131, 133, 135, 137, 139, 141, 143, 145, 147,
149, 151, 153, 155, 157, 159, 161, 163, 165, 167, 169, 171, 173, 175, 177,
179, 181, 183, 185, 187, 189, 191, 193, 195, 197, 199, 201, 203, 205, 207,
20 209, 211, 213, 215, 217, 219, 221, 223, 225, 227, 229, 231, 233, 235, 237,
239, 241, 243, 245, 247, 249, 251, 253, 255, 257, 259, 261, 263, 265, 267,
269, 271, 273, 275, 277, 279, 281, 283, 285, 287, 289, 291, 293, 295, 297,
299, 301, 303, 305, 307, 309, 311, 313, 315, 317, 319, 321, 323, 325, 327,
329, 331, 333, 335, 337, 339, 341, 343, 345, 347, 349, 351, 353, 355, 357,
25 359, 361, 363, 365, 367, 369, 371, 373, 375, 377, 379, 381, 383, 385, 387,
389, 391 or 393 or a fragment thereof, which confers an increase in the
amount of fine chemical in an organism or a part thereof;
- 30 (c) nucleic acid molecule whose sequence can be deduced from a polypeptide
sequence encoded by a nucleic acid molecule of (a) or (b) as a result of the
degeneracy of the genetic code and conferring an increase in the amount of
fine chemical in an organism or a part thereof;
- 35 (d) nucleic acid molecule which encodes a polypeptide which has at least 50%
identity with the amino acid sequence of the polypeptide encoded by the
nucleic acid molecule of (a) to (c) and conferring an increase in the amount
of fine chemical in an organism or a part thereof;
- (e) nucleic acid molecule which hybridizes with a nucleic acid molecule of (a) to
(c) under stringent hybridization conditions and conferring an increase in the
amount of fine chemical in an organism or a part thereof;

- 5 (f) nucleic acid molecule which encompasses a nucleic acid molecule which is obtained by amplifying nucleic acid molecules from a cDNA library or a genomic library using the primers in SEQ ID NO: 53 or SEQ ID NO: 54 and conferring an increase in the amount of the fine chemical in an organism or a part thereof;
- (g) nucleic acid molecule encoding a polypeptide which is isolated with the aid of monoclonal and/or polyclonal antibodies against a polypeptide encoded by one of the nucleic acid molecules of (a) to (f) and conferring an increase in the amount of fine chemical in an organism or a part thereof;
- 10 (h) nucleic acid molecule encoding a polypeptide comprising the consensus sequence as depicted in SEQ ID NO: 47, SEQ ID NO: 48, SEQ ID NO: 49, SEQ ID NO: 50, SEQ ID NO: 51, SEQ ID NO: 52, SEQ ID NO: 397, SEQ ID NO: 398, SEQ ID NO: 399 and/or SEQ ID NO: 400 and conferring an increase in the amount of the fine chemical in an organism or a part thereof;
- 15 and
- (i) nucleic acid molecule which is obtainable by screening a suitable nucleic acid library under stringent hybridization conditions with a probe comprising one of the sequences of the nucleic acid molecule of (a) to (k) or with a fragment thereof having at least 15 nt, preferably 20 nt, 30 nt, 50 nt, 100 nt, 200 nt or 500 nt of the nucleic acid molecule characterized in (a) to (k) and conferring an increase in the amount of the fine chemical in an organism or a part thereof,
- 20

whereby the nucleic acid molecule distinguishes over the sequence as depicted in SEQ ID NO: 1, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83, 85, 87, 89, 91, 93, 95, 97, 99, 101, 103, 105, 107, 109, 111, 113, 115, 117, 119, 121, 123, 125, 127, 129, 131, 133, 135, 137, 139, 141, 143, 145, 147, 149, 151, 153, 155, 157, 159, 161, 163, 165, 167, 169, 171, 173, 175, 177, 179, 181, 183, 185, 187, 189, 191, 193, 195, 197, 199, 201, 203, 205, 207, 209, 211, 213, 215, 217, 219, 221, 223, 225, 227, 229, 231, 233, 235, 237, 239, 241, 243, 245, 247, 249, 251, 253, 255, 257, 259, 261, 263, 265, 267, 269, 271, 273, 275, 277, 279, 281, 283, 285, 287, 289, 291, 293, 295, 297, 299, 301, 303, 305, 307, 309, 311, 313, 315, 317, 319, 321, 323, 325, 327, 329, 331, 333, 335, 337, 339, 341, 343, 345, 347, 349, 351, 353, 355, 357, 359, 361, 363, 365, 367, 369, 371, 373, 375, 377, 379, 381, 383, 385, 387, 389, 391 or 393 by one or more nucleotides.

- 35 7. A nucleic acid construct which confers the expression of the nucleic acid molecule of claim 6, comprising one or more regulatory elements.
8. A vector comprising the nucleic acid molecule as claimed in claim 6 or the nucleic acid construct of claim 7.

9. The vector as claimed in claim 8, wherein the nucleic acid molecule is in operable linkage with regulatory sequences for the expression in a prokaryotic or eukaryotic, or in a prokaryotic and eukaryotic, host.
- 5 10. A host cell, which has been transformed stably or transiently with the vector as claimed in claim 8 or 9 or the nucleic acid molecule as claimed in claim 6 or the nucleic acid construct of claim 7 or produced as described in claim any one of claims 2 to 4.
11. The host cell of claim 10, which is a transgenic host cell.
- 10 12. The host cell of claim 10 or 11, which is a plant cell, an animal cell, a microorganism, or a yeast cell, a fungus cell, a prokaryotic cell, an eukaryotic cell or an archaebacterium.
13. A process for producing a polypeptide, wherein the polypeptide is expressed in a host cell as claimed in any one of claims 9 to 11.
- 15 14. A polypeptide produced by the process as claimed in claim 13 or encoded by the nucleic acid molecule as claimed in claim 6 whereby the polypeptide distinguishes over the sequence as depicted in SEQ ID NO: 2, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 25 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392 or 394 by one or more amino acids.
15. An antibody, which binds specifically to the polypeptide encoded by a nucleic acid sequence as claimed in claim 6 a).
- 30 16. A plant tissue, propagation material, harvested material or a plant comprising the host cell as claimed in claim 12, which is plant cell or an Agrobacterium.
17. A method for screening for agonists and antagonists of the activity of a polypeptide encoded by the nucleic acid molecule of claim 6 conferring an increase in the amount of fine chemical in an organism or a part thereof comprising:
35

- 5 (a) contacting cells, tissues, plants or microorganisms which express the a polypeptide encoded by the nucleic acid molecule of claim 6 conferring an increase in the amount of the fine chemical in an organism or a part thereof with a candidate compound or a sample comprising a plurality of compounds under conditions which permit the expression the polypeptide;
- (b) assaying the fine chemical level or the polypeptide expression level in the cell, tissue, plant or microorganism or the media the cell, tissue, plant or microorganisms is cultured or maintained in; and
- 10 (c) identifying a agonist or antagonist by comparing the measured fine chemical level or polypeptide expression level with a standard fine chemical or polypeptide expression level measured in the absence of said candidate compound or a sample comprising said plurality of compounds, whereby an increased level over the standard indicates that the compound or the sample comprising said plurality of compounds is an agonist and a
- 15 decreased level over the standard indicates that the compound or the sample comprising said plurality of compounds is an antagonist.
18. A process for the identification of a compound conferring increased fine chemical production in a plant or microorganism, comprising the steps:
- 20 (a) culturing a plant cell or tissue or microorganism or maintaining a plant expressing the polypeptide encoded by the nucleic acid molecule of claim 6 conferring an increase in the amount of the fine chemical in an organism or a part thereof and a readout system capable of interacting with the polypeptide under suitable conditions which permit the interaction of the polypeptide with dais readout system in the presence of a compound or a
- 25 sample comprising a plurality of compounds and capable of providing a detectable signal in response to the binding of a compound to said polypeptide under conditions which permit the expression of said readout system and of the polypeptide encoded by the nucleic acid molecule of claim 6 conferring an increase in the amount of the fine chemical in an
- 30 organism or a part thereof;
- (b) identifying if the compound is an effective agonist by detecting the presence or absence or increase of a signal produced by said readout system.
19. A method for the identification of a gene product conferring an increase in the fine chemical production in a cell, comprising the following steps:
- 35 (a) contacting the nucleic acid molecules of a sample, which can contain a candidate gene encoding a gene product conferring an increase in fine chemical after expression with the nucleic acid molecule of claim 6;

- (b) identifying the nucleic acid molecules, which hybridize under relaxed stringent conditions with the nucleic acid molecule of claim 6;
- (c) introducing the candidate nucleic acid molecules in host cells appropriate for producing the fine chemical;
- 5 (d) expressing the identified nucleic acid molecules in the host cells;
- (e) assaying the fine chemical level in the host cells; and
- (f) identifying nucleic acid molecule and its gene product which expression confers an increase in the fine chemical level in the host cell in the host cell after expression compared to the wild type.
- 10 20. A method for the identification of a gene product conferring an increase in fine chemical production in a cell, comprising the following steps:
- (a) identifying in a data bank nucleic acid molecules of an organism; which can contain a candidate gene encoding a gene product conferring an increase in the fine chemical amount or level in an organism or a part thereof after expression, and which are at least 30% homolog to the nucleic acid molecule of claim 6;
- 15 (b) introducing the candidate nucleic acid molecules in host cells appropriate for producing the fine chemical;
- (c) expressing the identified nucleic acid molecules in the host cells;
- 20 (d) assaying the fine chemical level in the host cells; and
- (e) identifying nucleic acid molecule and its gene product which expression confers an increase in the fine chemical level in the host cell after expression compared to the wild type.
- 25 21. A method for the production of an agricultural composition comprising the steps of the method of any one of claims 17 to 20 and formulating the compound identified in any one of claims 17 to 20 in a form acceptable for an application in agriculture.
- 30 22. A composition comprising the nucleic acid molecule of claim 6, the polypeptide of claim 14, the nucleic acid construct of claim 7, the vector of any one of claims 8 or 9, an antagonist or agonist identified according to claim 17, the compound of claim 18, the gene product of claim 19 or 20, the antibody of claim 15, and optionally an agricultural acceptable carrier.

23. Use of the nucleic acid molecule as claimed in claim 6 for the identification of a nucleic acid molecule conferring an increase of the fine chemical after expression.
- 5 24. Use of the polypeptide of claim 14 or the nucleic acid construct claim 7 or the gene product identified according to the method of claim 18 or 19 for identifying compounds capable of conferring a modulation of the fine chemical levels in an organism.
- 10 25. Food or feed composition comprising the nucleic acid molecule of claim 6, the polypeptide of claim 14, the nucleic acid construct of claim 7, the vector of claim 8 or 9, the antagonist or agonist identified according to claim 17, the antibody of claim 15, the plant or plant tissue of claim 16, the harvested material of claim 16, the host cell of claim 10 to 12 or the gene product identified according to the method of claim 19 or 20.
- 15 26. Use of the nucleic acid molecule as claimed in claim 6 in mapping and breeding processes for the identification of plant varieties having and increased capacity for production of the fine chemical.

Figure 1: Protein alignment of Rho small GTPases from *Oryza sativa* cv. Noppon-Brarre (a japonica rice), *Brassica napus* cv. "AC Excel" "Quantum" and "Cresor" (canola), and *Glycine max* cv. Resnick (soybean). Boxes (dotted line) represent the identical amino acid.

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Leu Pro Arg Pro Thr Ala Ser
 195

<210> 5

<211> 648

<212> DNA

<213> Oryza sativa

<220>

<221> CDS

<222> (1)..(648)

<223>

<400> 5
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 Met Ala Ser Ser Ala Ser Arg Phe Ile Lys Cys Val Thr Val Gly Asp
 1 5 10 15
 ggc gcc gtc ggc aag acc tgc atg ctc atc tgc tac acc agc aac aag 96
 Gly Ala Val Gly Lys Thr Cys Met Leu Ile Cys Tyr Thr Ser Asn Lys
 20 25 30
 ttc ccc act gat tac gta ccc act gtt ttt gac aat ttc agt gca aac 144
 Phe Pro Thr Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn
 35 40 45
 gtg gtg gtc gac ggc acc acg gtg aat ttg ggt ctc tgg gat act gca 192
 Val Val Val Asp Gly Thr Thr Val Asn Leu Gly Leu Trp Asp Thr Ala
 50 55 60
 ggg cag gaa gat tac aac aga ttg agg ccg cta agc tac cgt ggc gcc 240
 Gly Gln Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala
 65 70 75 80
 gat gtc ttt gtg ctt gcc ttc tcc cta gtg agc cga gct agc tat gag 288
 Asp Val Phe Val Leu Ala Phe Ser Leu Val Ser Arg Ala Ser Tyr Glu
 85 90 95
 aat gtc atg aag aag tgg tta cca gag ctt cag cat tat gca cca ggg 336
 Asn Val Met Lys Lys Trp Leu Pro Glu Leu Gln His Tyr Ala Pro Gly

										6/291											
100										105	110										
gtg	cca	att	gtg	ttg	gtt	ggg	acc	aaa	ttg	gat	ctt	cgt	gaa	gat	aaa	384					
Val	Pro	Ile	Val	Leu	Val	Gly	Thr	Lys	Leu	Asp	Leu	Arg	Glu	Asp	Lys						
115										120	125										
cac	tac	tta	ctt	gac	cat	cct	agc	ttg	gtg	cct	gtg	act	aca	gca	cag	432					
His	Tyr	Leu	Leu	Asp	His	Pro	Ser	Leu	Val	Pro	Val	Thr	Thr	Ala	Gln						
130										135	140										
gga	gag	gaa	ctc	cgc	aag	cac	att	ggc	gca	acg	tgt	tac	atc	gaa	tgc	460					
Gly	Glu	Glu	Leu	Arg	Lys	His	Ile	Gly	Ala	Thr	Cys	Tyr	Ile	Glu	Cys						
145										150	155										160
agc	tca	aag	aca	cag	cag	aat	gta	aaa	gct	gtg	ttt	gat	gct	gcc	atc	528					
Ser	Ser	Lys	Thr	Gln	Gln	Asn	Val	Lys	Ala	Val	Phe	Asp	Ala	Ala	Ile						
165										170										175	
aag	gta	gta	atc	aag	cct	cca	aca	aag	cag	agg	gac	agg	aag	aag	aag	576					
Lys	Val	Val	Ile	Lys	Pro	Pro	Thr	Lys	Gln	Arg	Asp	Arg	Lys	Lys	Lys						
180										185										190	
aaa	aca	cgg	cgc	gga	tgt	tct	ttc	ttc	tgc	aag	ggt	gtc	atg	tcc	aga	624					
Lys	Thr	Arg	Arg	Gly	Cys	Ser	Phe	Phe	Cys	Lys	Gly	Val	Met	Ser	Arg						
195										200										205	
aga	agg	cta	gta	tgc	ttc	aag	tga									648					
Arg	Arg	Leu	Val	Cys	Phe	Lys															
210										215											
<210> 6																					
<211> 215																					
<212> PRT																					
<213> Oryza sativa																					
<400> 6																					
Met	Ala	Ser	Ser	Ala	Ser	Arg	Phe	Ile	Lys	Cys	Val	Thr	Val	Gly	Asp						
1				5				10				15									
Gly	Ala	Val	Gly	Lys	Thr	Cys	Met	Leu	Ile	Cys	Tyr	Thr	Ser	Asn	Lys						
20										25										30	
Phe	Pro	Thr	Asp	Tyr	Val	Pro	Thr	Val	Phe	Asp	Asn	Phe	Ser	Ala	Asn						
35										40										45	
Val	Val	Val	Asp	Gly	Thr	Thr	Val	Asn	Leu	Gly	Leu	Trp	Asp	Thr	Ala						
50										55										60	
Gly	Gln	Glu	Asp	Tyr	Asn	Arg	Leu	Arg	Pro	Leu	Ser	Tyr	Arg	Gly	Ala						
65										70										75	80
Asp	Val	Phe	Val	Leu	Ala	Phe	Ser	Leu	Val	Ser	Arg	Ala	Ser	Tyr	Glu						
85										90										95	

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Asn Val Met Lys Lys Trp Leu Pro Glu Leu Gln His Tyr Ala Pro Gly
 100 105 110

Val Pro Ile Val Leu Val Gly Thr Lys Leu Asp Leu Arg Glu Asp Lys
 115 120 125

His Tyr Leu Leu Asp His Pro Ser Leu Val Pro Val Thr Thr Ala Gln
 130 135 140

Gly Glu Glu Leu Arg Lys His Ile Gly Ala Thr Cys Tyr Ile Glu Cys
 145 150 155 160

Ser Ser Lys Thr Gln Gln Asn Val Lys Ala Val Phe Asp Ala Ala Ile
 165 170 175

Lys Val Val Ile Lys Pro Pro Thr Lys Gln Arg Asp Arg Lys Lys Lys
 180 185 190

Lys Thr Arg Arg Gly Cys Ser Phe Phe Cys Lys Gly Val Met Ser Arg
 195 200 205

Arg Arg Leu Val Cys Phe Lys
 210 215

<210> 7

<211> 591

<212> DNA

<213> Brassica napus

<220>

<221> CDS

<222> (1)..(591)

<223>

<400> 7

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 1 5 10 15

gtc gga aaa acc tgt atg ctg atc tct tac acc agc aac act ttc cct 96
 Val Gly Lys Thr Cys Met Leu Ile Ser Tyr Thr Ser Asn Thr Phe Pro
 20 25 30

acg gac tat gtt cca act gtt ttc gac aac ttc agt gct aac gtg gtt 144
 Thr Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val Val
 35 40 45

gtt gat ggg aac act gtg aat ctt gga ttg tgg gat aca gct ggt caa 192
 Val Asp Gly Asn Thr Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln

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50	55	60	
gaa gac tat aac agg tta aga cca ttg agt tac cgt ggt gca gat gtc			240
Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp Val			
65	70	75	80
ttc att ctt gct ttc tct ctt att agc aaa gct agc tac gag aac ata			288
Phe Ile Leu Ala Phe Ser Leu Ile Ser Lys Ala Ser Tyr Glu Asn Ile			
	85	90	95
gcc aag aag tgg att cct gag ctc agg cat tat gcc cct gga gtt cct			336
Ala Lys Lys Trp Ile Pro Glu Leu Arg His Tyr Ala Pro Gly Val Pro			
	100	105	110
atc att ctc gtg ggg aca aaa ctc gat ctt cga gat gac aag cag ttc			384
Ile Ile Leu Val Gly Thr Lys Leu Asp Leu Arg Asp Lys Lys Gln Phe			
	115	120	125
ttc ata gac cat ccc ggt gca gtg cca atc act aca aac cag gga gag			432
Phe Ile Asp His Pro Gly Ala Val Pro Ile Thr Thr Asn Gln Gly Glu			
	130	135	140
gaa cta aag aaa ctc ata gga tct cca gtt tac att gaa tgt agt tca			480
Glu Leu Lys Lys Leu Ile Gly Ser Pro Val Tyr Ile Glu Cys Ser Ser			
	145	150	155
aag acg cag cag aat gtc aaa gca gtc ttt gac gca gct att aaa gtg			528
Lys Thr Gln Gln Asn Val Lys Ala Val Phe Asp Ala Ala Ile Lys Val			
	165	170	175
gtg ctt cag cca cca aaa tca aag aag aag aaa aag aac aag aat cgt			576
Val Leu Gln Pro Pro Lys Ser Lys Lys Lys Lys Asn Lys Asn Arg			
	180	185	190
tgc gtt ttc ttg tga			591
Cys Val Phe Leu			
	195		

<210> 8

<211> 196

<212> PRT

<213> Brassica napus

<400> 8

Met Ser Ala Ser Arg Phe Ile Lys Cys Val Thr Val Gly Asp Gly Ala			
1	5	10	15

Val Gly Lys Thr Cys Met Leu Ile Ser Tyr Thr Ser Asn Thr Phe Pro			
	20	25	30

Thr Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val Val			
	35	40	45

Val Asp Gly Asn Thr Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln			
	50	55	60

Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp Val			
---	--	--	--

65 70 9/291 75 80

Phe Ile Leu Ala Phe Ser Leu Ile Ser Lys Ala Ser Tyr Glu Asn Ile
85 90 95

Ala Lys Lys Trp Ile Pro Glu Leu Arg His Tyr Ala Pro Gly Val Pro
100 105 110

Ile Ile Leu Val Gly Thr Lys Leu Asp Leu Arg Asp Asp Lys Gln Phe
115 120 125

Phe Ile Asp His Pro Gly Ala Val Pro Ile Thr Thr Asn Gln Gly Glu
130 135 140

Glu Leu Lys Lys Leu Ile Gly Ser Pro Val Tyr Ile Glu Cys Ser Ser
145 150 155 160

Lys Thr Gln Gln Asn Val Lys Ala Val Phe Asp Ala Ala Ile Lys Val
165 170 175

Val Leu Gln Pro Pro Lys Ser Lys Lys Lys Lys Asn Lys Asn Arg
180 185 190

Cys Val Phe Leu
195

<210> 9

<211> 597

<212> DNA

<213> Brassica napus

<220>

<221> CDS

<222> (1)..(597)

<223>

<400> 9

atg agt gct tgc agg ttt atc aag tgt gtc acc gtc ggc gac ggc gct 48
Met Ser Ala Ser Arg Phe Ile Lys Cys Val Thr Val Gly Asp Gly Ala
1 5 10 15

gtc gga aag act tgt ctg ctc atc tcc tac act agc aac act ttc ccc 96
Val Gly Lys Thr Cys Leu Leu Ile Ser Tyr Thr Ser Asn Thr Phe Pro
20 25 30

acg gac tat gtg cca act gtg ttt gat aat ttc agc gcg aat gtg att 144
Thr Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val Ile
35 40 45

10/291

gtg gat ggg aac act atc aac ttg gga ttg tgg gat act gca ggg caa 192
 Val Asp Gly Asn Thr Ile Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln
 50 55 60

gag gac tac aat aga cta aga cca ttg agc tat cgc ggc gca gat gtc 240
 Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp Val
 65 70 75 80

ttc tta ctc gct ttc tcc ctt gtc agc aaa gct agc tat gaa aat gtt 288
 Phe Leu Leu Ala Phe Ser Leu Val Ser Lys Ala Ser Tyr Glu Asn Val
 85 90 95

tct aaa aag tgg gta cct gaa ctg aga cat tat gct cct ggt gtt cca 336
 Ser Lys Lys Trp Val Pro Glu Leu Arg His Tyr Ala Pro Gly Val Pro
 100 105 110

atc atc ctc gtc gga acc aag ctt gat ctt cga gat gac aag caa ttc 384
 Ile Ile Leu Val Gly Thr Lys Leu Asp Leu Arg Asp Asp Lys Gln Phe
 115 120 125

ttt gtt gag cac cct ggt gct gtg cct atc tct act gct cag ggt gaa 432
 Phe Val Glu His Pro Gly Ala Val Pro Ile Ser Thr Ala Gln Gly Glu
 130 135 140

gaa ctg aag aag gtg att ggg gca cct gct tat att gaa tgc agt gca 480
 Glu Leu Lys Lys Val Ile Gly Ala Pro Ala Tyr Ile Glu Cys Ser Ala
 145 150 155 160

aaa aca caa cag aat gta aaa gcg gtg ttt gat gcg gct atc aag gta 528
 Lys Thr Gln Gln Asn Val Lys Ala Val Phe Asp Ala Ala Ile Lys Val
 165 170 175

gtt ctc caa cca ccc aaa aac aag aag agg aag aag aga aag tct cag 576
 Val Leu Gln Pro Pro Lys Asn Lys Lys Arg Lys Lys Arg Lys Ser Gln
 180 185 190

aaa gct tgt tct ata ttg tga 597
 Lys Ala Cys Ser Ile Leu
 195

<210> 10

<211> 198

<212> PRT

<213> Brassica napus

<400> 10

Met Ser Ala Ser Arg Phe Ile Lys Cys Val Thr Val Gly Asp Gly Ala
 1 5 10 15

Val Gly Lys Thr Cys Leu Leu Ile Ser Tyr Thr Ser Asn Thr Phe Pro
 20 25 30

Thr Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val Ile
 35 40 45

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Val Asp Gly Asn Thr Ile Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln
 50 55 60

Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp Val
 65 70 75 80

Phe Leu Leu Ala Phe Ser Leu Val Ser Lys Ala Ser Tyr Glu Asn Val
 85 90 95

Ser Lys Lys Trp Val Pro Glu Leu Arg His Tyr Ala Pro Gly Val Pro
 100 105 110

Ile Ile Leu Val Gly Thr Lys Leu Asp Leu Arg Asp Asp Lys Gln Phe
 115 120 125

Phe Val Glu His Pro Gly Ala Val Pro Ile Ser Thr Ala Gln Gly Glu
 130 135 140

Glu Leu Lys Lys Val Ile Gly Ala Pro Ala Tyr Ile Glu Cys Ser Ala
 145 150 155 160

Lys Thr Gln Gln Asn Val Lys Ala Val Phe Asp Ala Ala Ile Lys Val
 165 170 175

Val Leu Gln Pro Pro Lys Asn Lys Lys Arg Lys Lys Arg Lys Ser Gln
 180 185 190

Lys Ala Cys Ser Ile Leu
 195

<210> 11

<211> 591

<212> DNA

<213> Glycine max

<220>

<221> CDS

<222> (1)..(591)

<223>

<400> 11

atg agt acg gca agg ttt atc aag tgt gta aca gtt gga gat ggt gct
 Met Ser Thr Ala Arg Phe Ile Lys Cys Val Thr Val Gly Asp Gly Ala
 1 5 10 15

48

gtg gga aag aca tgc atg ctt ata tcc tat acc agc aat acc ttt ccc
 Val Gly Lys Thr Cys Met Leu Ile Ser Tyr Thr Ser Asn Thr Phe Pro
 20 25 30

96

12/291

acg gat tat gtt cca aca gtg ttt gac aat ttc agt gct aat gta acg 144
 Thr Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val Thr
 35 40 45
 gtg gat ggt agt act gtt aat ctt ggt tta tgg gac act gca gga caa 192
 Val Asp Gly Ser Thr Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln
 50 55 60
 gaa gat tac aac agg cta agg cct tta agc tat aga gga gct gat gtg 240
 Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp Val
 65 70 75 80
 ttt ttg ttg tgc tat tct ctg atc agc aaa gcc agt tat gag aac atc 288
 Phe Leu Leu Cys Tyr Ser Leu Ile Ser Lys Ala Ser Tyr Glu Asn Ile
 85 90 95
 tcc aaa aag tgg ata cct gag cta aga cat tat gct cca aat gtg cct 336
 Ser Lys Lys Trp Ile Pro Glu Leu Arg His Tyr Ala Pro Asn Val Pro
 100 105 110
 ata gtg ctg gtg gga aca aaa cta gat ttg cga gat gac aag caa ttt 384
 Ile Val Leu Val Gly Thr Lys Leu Asp Leu Arg Asp Asp Lys Gln Phe
 115 120 125
 ctg att gat cat ccg gga tcc gca cga ata aca act gct cag ggt gaa 432
 Leu Ile Asp His Pro Gly Ser Ala Arg Ile Thr Thr Ala Gln Gly Glu
 130 135 140
 gaa ttg aag aaa atg att ggt gca gtc act tat att gag tgc agc tcc 480
 Glu Leu Lys Lys Met Ile Gly Ala Val Thr Tyr Ile Glu Cys Ser Ser
 145 150 155 160
 aaa aca cag ctg aat gtg aag aca gtt ttt gat gct gca ata aag gtt 528
 Lys Thr Gln Leu Asn Val Lys Thr Val Phe Asp Ala Ala Ile Lys Val
 165 170 175
 gca ttg aag cca cca aag cca aag aag aaa cca cgc aag aaa agg acc 576
 Ala Leu Lys Pro Pro Lys Pro Lys Lys Lys Pro Arg Lys Lys Arg Thr
 180 185 190
 tgt act ttc ctg tga 591
 Cys Thr Phe Leu
 195

<210> 12

<211> 196

<212> PRT

<213> Glycine max

<400> 12

Met Ser Thr Ala Arg Phe Ile Lys Cys Val Thr Val Gly Asp Gly Ala
 1 5 10 15

Val Gly Lys Thr Cys Met Leu Ile Ser Tyr Thr Ser Asn Thr Phe Pro
 20 25 30

Thr Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val Thr
 35 40 45

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Val Asp Gly Ser Thr Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln
50 55 60

Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp Val
65 70 75 80

Phe Leu Leu Cys Tyr Ser Leu Ile Ser Lys Ala Ser Tyr Glu Asn Ile
85 90 95

Ser Lys Lys Trp Ile Pro Glu Leu Arg His Tyr Ala Pro Asn Val Pro
100 105 110

Ile Val Leu Val Gly Thr Lys Leu Asp Leu Arg Asp Asp Lys Gln Phe
115 120 125

Leu Ile Asp His Pro Gly Ser Ala Arg Ile Thr Thr Ala Gln Gly Glu
130 135 140

Glu Leu Lys Lys Met Ile Gly Ala Val Thr Tyr Ile Glu Cys Ser Ser
145 150 155 160

Lys Thr Gln Leu Asn Val Lys Thr Val Phe Asp Ala Ala Ile Lys Val
165 170 175

Ala Leu Lys Pro Pro Lys Pro Lys Lys Lys Pro Arg Lys Lys Arg Thr
180 185 190

Cys Thr Phe Leu
195

<210> 13

<211> 594

<212> DNA

<213> Glycine max

<220>

<221> CDS

<222> (1) .. (594)

<223>

<400> 13

atg agc aca aca cgg ttt att aag tgt gtc aca gtt ggt gat ggg gct 48
Met Ser Thr Thr Arg Phe Ile Lys Cys Val Thr Val Gly Asp Gly Ala
1 5 10 15

gtg gga aag act tgc atg ctt atc tct tac act agc aac act ttc ccc 96

14/291

Val Gly Lys Thr Cys Met Leu Ile Ser Tyr Thr Ser Asn Thr Phe Pro	20	25	30	
acg gat tat gtt cct aca gtt ttc gac aat ttc agt gca aat gtt gtg				144
Thr Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val Val	35	40	45	
gtt gat ggc agc aca gtt aac ctg gga ttg tgg gac act gct gga cag				192
Val Asp Gly Ser Thr Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln	50	55	60	
gaa gat tac aac agg ctt agg cca ttg agt tac aga gga gca gat gtg				240
Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp Val	65	70	75	80
ttc ttg ctg gcc ttt tcc ctc atc agc aaa gcc agc tat gaa aat ata				288
Phe Leu Leu Ala Phe Ser Leu Ile Ser Lys Ala Ser Tyr Glu Asn Ile	85	90	95	
tct aaa aag tgg att cct gaa ttg aga cat tat gcc cca act gtg cct				336
Ser Lys Lys Trp Ile Pro Glu Leu Arg His Tyr Ala Pro Thr Val Pro	100	105	110	
att gta ctg gtt gga act aaa ctt gat ttg agg gaa gac agg caa tat				384
Ile Val Leu Val Gly Thr Lys Leu Asp Leu Arg Glu Asp Arg Gln Tyr	115	120	125	
ttg att gat cat cct gga acc aca gct ata gct act gcc cag gga gaa				432
Leu Ile Asp His Pro Gly Thr Thr Ala Ile Ala Thr Ala Gln Gly Glu	130	135	140	
gaa ctg aag aag gca att ggt gct gct gtg tac ata gag tgc agc tca				480
Glu Leu Lys Lys Ala Ile Gly Ala Ala Val Tyr Ile Glu Cys Ser Ser	145	150	155	160
aag act cag cag aat gtg aag gcc gtg ttt gat gct gca atc aag gtt				528
Lys Thr Gln Gln Asn Val Lys Ala Val Phe Asp Ala Ala Ile Lys Val	165	170	175	
gtt ttg caa cca cct aag tcc aag aaa aaa gga aag aag aag aac acg				576
Val Leu Gln Pro Pro Lys Ser Lys Lys Lys Gly Lys Lys Lys Asn Thr	180	185	190	
cct tgt gtt ttc ctc tga				594
Pro Cys Val Phe Leu	195			

<210> 14

<211> 197

<212> PRT

<213> Glycine max

<400> 14

Met Ser Thr Thr Arg Phe Ile Lys Cys Val Thr Val Gly Asp Gly Ala	1	5	10	15
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Val Gly Lys Thr Cys Met Leu Ile Ser Tyr Thr Ser Asn Thr Phe Pro	20	25	30
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Thr Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val Val
 35 40 45

Val Asp Gly Ser Thr Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln
 50 55 60

Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp Val
 65 70 75 80

Phe Leu Leu Ala Phe Ser Leu Ile Ser Lys Ala Ser Tyr Glu Asn Ile
 85 90 95

Ser Lys Lys Trp Ile Pro Glu Leu Arg His Tyr Ala Pro Thr Val Pro
 100 105 110

Ile Val Leu Val Gly Thr Lys Leu Asp Leu Arg Glu Asp Arg Gln Tyr
 115 120 125

Leu Ile Asp His Pro Gly Thr Thr Ala Ile Ala Thr Ala Gln Gly Glu
 130 135 140

Glu Leu Lys Lys Ala Ile Gly Ala Ala Val Tyr Ile Glu Cys Ser Ser
 145 150 155 160

Lys Thr Gln Gln Asn Val Lys Ala Val Phe Asp Ala Ala Ile Lys Val
 165 170 175

Val Leu Gln Pro Pro Lys Ser Lys Lys Lys Gly Lys Lys Lys Asn Thr
 180 185 190

Pro Cys Val Phe Leu
 195

<210> 15

<211> 591

<212> DNA

<213> Glycine max

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<222> (1)..(591)

<223>

<400> 15

atg agt gcg tcg agg ttc att aag tgc gtc acc gtc ggc gac ggt gct
 Met Ser Ala Ser Arg Phe Ile Lys Cys Val Thr Val Gly Asp Gly Ala
 1 5 10 15

16/291

gtc ggc aaa acc tgc ttg ttg att tcc tac acc agc aac act ttt ccc 96
Val Gly Lys Thr Cys Leu Leu Ile Ser Tyr Thr Ser Asn Thr Phe Pro
20 25 30

acg gac tat gtg ccc acc gtt ttt gac aat ttc agt gct aat gtg gtg 144
Thr Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val Val
35 40 45

gtg gat gga agc acc gta aac cta gga ttg tgg gat aca gct ggt cag 192
Val Asp Gly Ser Thr Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln
50 55 60

gag gat tac aat aga tta aga ccc ttg agc tat cga gga gct gat gtc 240
Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp Val
65 70 75 80

ttc ata ctt gcc ttt tct ctc ata agc aag gct agc tat gaa aat att 288
Phe Ile Leu Ala Phe Ser Leu Ile Ser Lys Ala Ser Tyr Glu Asn Ile
85 90 95

gca aag aag tgg atc cct gaa cta agg cat tat gcc cct ggt gtt cca 336
Ala Lys Lys Trp Ile Pro Glu Leu Arg His Tyr Ala Pro Gly Val Pro
100 105 110

ata att ctc gtt gga aca aag tta gat ctt cgg gat gat aag caa ttt 384
Ile Ile Leu Val Gly Thr Lys Leu Asp Leu Arg Asp Asp Lys Gln Phe
115 120 125

ttt atg gac cat cct ggt gca gtg cca att act aca gca cag gga gaa 432
Phe Met Asp His Pro Gly Ala Val Pro Ile Thr Thr Ala Gln Gly Glu
130 135 140

gaa ttg aga aag ctg att ggt gct ccg gcc tac att gag tgt agt tcc 480
Glu Leu Arg Lys Leu Ile Gly Ala Pro Ala Tyr Ile Glu Cys Ser Ser
145 150 155 160

aaa acg caa cag aac gtg aaa gct gtc ttt gac gcg gca atc aaa gtg 528
Lys Thr Gln Gln Asn Val Lys Ala Val Phe Asp Ala Ala Ile Lys Val
165 170 175

gtt atc caa cca cca aag cta aag aaa aag aga aaa aca cag aaa gct 576
Val Ile Gln Pro Pro Lys Leu Lys Lys Lys Arg Lys Thr Gln Lys Ala
180 185 190

tgc tcc ata tta tga 591
Cys Ser Ile Leu
195

<210> 16

<211> 196

<212> PRT

<213> Glycine max

<400> 16

Met Ser Ala Ser Arg Phe Ile Lys Cys Val Thr Val Gly Asp Gly Ala
1 5 10 15

Val Gly Lys Thr Cys Leu Leu Ile Ser Tyr Thr Ser Asn Thr Phe Pro
20 25 30

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Thr Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val Val
 35 40 45

Val Asp Gly Ser Thr Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln
 50 55 60

Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp Val
 65 70 75 80

Phe Ile Leu Ala Phe Ser Leu Ile Ser Lys Ala Ser Tyr Glu Asn Ile
 85 90 95

Ala Lys Lys Trp Ile Pro Glu Leu Arg His Tyr Ala Pro Gly Val Pro
 100 105 110

Ile Ile Leu Val Gly Thr Lys Leu Asp Leu Arg Asp Asp Lys Gln Phe
 115 120 125

Phe Met Asp His Pro Gly Ala Val Pro Ile Thr Thr Ala Gln Gly Glu
 130 135 140

Glu Leu Arg Lys Leu Ile Gly Ala Pro Ala Tyr Ile Glu Cys Ser Ser
 145 150 155 160

Lys Thr Gln Gln Asn Val Lys Ala Val Phe Asp Ala Ala Ile Lys Val
 165 170 175

Val Ile Gln Pro Pro Lys Leu Lys Lys Lys Arg Lys Thr Gln Lys Ala
 180 185 190

Cys Ser Ile Leu
 195

<210> 17

<211> 594

<212> DNA

<213> Glycine max

<220>

<221> CDS

<222> (1)..(594)

<223>

<400> 17

atg agc gct tct agg ttc atc aag tgc gtc act gtt ggg gat ggt gct

48

18/291

Met Ser Ala Ser Arg Phe Ile Lys Cys Val Thr Val Gly Asp Gly Ala
 1 5 10 15
 gtg ggc aaa acc tgt ttg ctt att tcc tac acc agc aac act ttt ccc 96
 Val Gly Lys Thr Cys Leu Leu Ile Ser Tyr Thr Ser Asn Thr Phe Pro
 20 25 30
 acc gat tat gtg ccg act gtt ttt gac aat ttc agc gca aat gtg gtt 144
 Thr Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val Val
 35 40 45
 gtc aat ggg agc att gtg aat ctg ggt ttg tgg gat act gct gga caa 192
 Val Asn Gly Ser Ile Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln
 50 55 60
 gag gat tat aac aga tta aga cct ttg agt tac cgt ggt gcc gat gtt 240
 Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp Val
 65 70 75 80
 ttc ata ctg gct ttc tct ctc ata agc aag gcc agt tat gaa aat gtc 288
 Phe Ile Leu Ala Phe Ser Leu Ile Ser Lys Ala Ser Tyr Glu Asn Val
 85 90 95
 tct aaa aag tgg att ccg gag ttg aag cat tat gct cct ggt gtc ccc 336
 Ser Lys Lys Trp Ile Pro Glu Leu Lys His Tyr Ala Pro Gly Val Pro
 100 105 110
 att att ctg gtt ggc aca aag ctt gac ctt cgg gat gat aag cag ttc 384
 Ile Ile Leu Val Gly Thr Lys Leu Asp Leu Arg Asp Asp Lys Gln Phe
 115 120 125
 tgc att gac cat cct ggt gcc gta cct att acc aca gct cag gga gaa 432
 Cys Ile Asp His Pro Gly Ala Val Pro Ile Thr Thr Ala Gln Gly Glu
 130 135 140
 gag ctt agg aag ctg att aat gcg cca gct tac att gaa tgc agt tca 480
 Glu Leu Arg Lys Leu Ile Asn Ala Pro Ala Tyr Ile Glu Cys Ser Ser
 145 150 155 160
 aaa aca cag gag aac gtg aag gca gtc ttt gat gca gcc ata aga gtt 528
 Lys Thr Gln Glu Asn Val Lys Ala Val Phe Asp Ala Ala Ile Arg Val
 165 170 175
 gtc ctt caa cca cct aag cag aag aaa aag aag ggt aaa gca caa aag 576
 Val Leu Gln Pro Pro Lys Gln Lys Lys Lys Lys Gly Lys Ala Gln Lys
 180 185 190
 gcc tgt tcg ata ttg tga 594
 Ala Cys Ser Ile Leu
 195

<210> 18

<211> 197

<212> PRT

<213> Glycine max

<400> 18

Met Ser Ala Ser Arg Phe Ile Lys Cys Val Thr Val Gly Asp Gly Ala
 1 5 10 15

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Val Gly Lys Thr Cys Leu Leu Ile Ser Tyr Thr Ser Asn Thr Phe Pro
 20 25 30
 Thr Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val Val
 35 40 45
 Val Asn Gly Ser Ile Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln
 50 55 60
 Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp Val
 65 70 75 80
 Phe Ile Leu Ala Phe Ser Leu Ile Ser Lys Ala Ser Tyr Glu Asn Val
 85 90 95
 Ser Lys Lys Trp Ile Pro Glu Leu Lys His Tyr Ala Pro Gly Val Pro
 100 105 110
 Ile Ile Leu Val Gly Thr Lys Leu Asp Leu Arg Asp Asp Lys Gln Phe
 115 120 125
 Cys Ile Asp His Pro Gly Ala Val Pro Ile Thr Thr Ala Gln Gly Glu
 130 135 140
 Glu Leu Arg Lys Leu Ile Asn Ala Pro Ala Tyr Ile Glu Cys Ser Ser
 145 150 155 160
 Lys Thr Gln Glu Asn Val Lys Ala Val Phe Asp Ala Ala Ile Arg Val
 165 170 175
 Val Leu Gln Pro Pro Lys Gln Lys Lys Lys Lys Gly Lys Ala Gln Lys
 180 185 190
 Ala Cys Ser Ile Leu
 195

<210> 19

<211> 594

<212> DNA

<213> Glycine max

<220>

<221> CDS

<222> (1)..(594)

<223>

20/291

<400> 19
 atg agt gcg tcc agg ttc atc aag tgt gtc act gtg ggt gac ggt gcc 48
 Met Ser Ala Ser Arg Phe Ile Lys Cys Val Thr Val Gly Asp Gly Ala
 1 5 10 15

gtt ggc aag act tgc atg ctc atc tcc tac acc agc aac act ttt cct 96
 Val Gly Lys Thr Cys Met Leu Ile Ser Tyr Thr Ser Asn Thr Phe Pro
 20 25 30

acg gac tac gtg cca act gtc ttt gac aat ttc agt gca aat gtc gtt 144
 Thr Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val Val
 35 40 45

gtg gat gga agc act gtg aat ctt ggg ttg tgg gat act gct ggc caa 192
 Val Asp Gly Ser Thr Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln
 50 55 60

gaa gat tac aat aga ttg aga ccc tta agc tat cgt gga gca gat gta 240
 Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp Val
 65 70 75 80

ttc ctg ctt gct ttc tct ctc ata agc agg gcc agc tat gaa aat gtt 288
 Phe Leu Leu Ala Phe Ser Leu Ile Ser Arg Ala Ser Tyr Glu Asn Val
 85 90 95

gcc aag aaa tgg att cct gag ttg agg cat tat gct cct ggt gtt cca 336
 Ala Lys Lys Trp Ile Pro Glu Leu Arg His Tyr Ala Pro Gly Val Pro
 100 105 110

att att ctt gtt gga aca aaa ctt gat ctt cgg gat gat aag cag ttc 384
 Ile Ile Leu Val Gly Thr Lys Leu Asp Leu Arg Asp Asp Lys Gln Phe
 115 120 125

ttt caa gac cat cct ggt gca gtg cct atc acc aca gca cag ggt gag 432
 Phe Gln Asp His Pro Gly Ala Val Pro Ile Thr Thr Ala Gln Gly Glu
 130 135 140

gaa ctg aga aag ctt atc ggt gct cca att tac att gaa tgt agt tca 480
 Glu Leu Arg Lys Leu Ile Gly Ala Pro Ile Tyr Ile Glu Cys Ser Ser
 145 150 155 160

aaa aca caa cag aat gtg aag gct gtt ttt gat gca gcc atc aag gta 528
 Lys Thr Gln Gln Asn Val Lys Ala Val Phe Asp Ala Ala Ile Lys Val
 165 170 175

gtt ctc cag ccc cca aag cag aag aaa aag aag aga aag gga caa aag 576
 Val Leu Gln Pro Pro Lys Gln Lys Lys Lys Arg Lys Gly Gln Lys
 180 185 190

gcc tgt tcc att ttg tga 594
 Ala Cys Ser Ile Leu
 195

<210> 20
 <211> 197
 <212> PRT
 <213> Glycine max

<400> 20
 Met Ser Ala Ser Arg Phe Ile Lys Cys Val Thr Val Gly Asp Gly Ala
 1 5 10 15

Val Gly Lys Thr Cys Met Leu Ile Ser Tyr Thr Ser Asn Thr Phe Pro
20 25 30

Thr Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val Val
35 40 45

Val Asp Gly Ser Thr Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln
50 55 60

Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp Val
65 70 75 80

Phe Leu Leu Ala Phe Ser Leu Ile Ser Arg Ala Ser Tyr Glu Asn Val
85 90 95

Ala Lys Lys Trp Ile Pro Glu Leu Arg His Tyr Ala Pro Gly Val Pro
100 105 110

Ile Ile Leu Val Gly Thr Lys Leu Asp Leu Arg Asp Asp Lys Gln Phe
115 120 125

Phe Gln Asp His Pro Gly Ala Val Pro Ile Thr Thr Ala Gln Gly Glu
130 135 140

Glu Leu Arg Lys Leu Ile Gly Ala Pro Ile Tyr Ile Glu Cys Ser Ser
145 150 155 160

Lys Thr Gln Gln Asn Val Lys Ala Val Phe Asp Ala Ala Ile Lys Val
165 170 175

Val Leu Gln Pro Pro Lys Gln Lys Lys Lys Arg Lys Gly Gln Lys
180 185 190

Ala Cys Ser Ile Leu
195

<210> 21

<211> 594

<212> DNA

<213> Glycine max

<220>

<221> CDS

<222> (1)..(594)

<223>

<400> 21
 atg agt gcg tcc agg ttc atc aag tgt gtc act gtg ggt gac ggt gcc 48
 Met Ser Ala Ser Arg Phe Ile Lys Cys Val Thr Val Gly Asp Gly Ala
 1 5 10 15

 gtt ggc aag act tgc atg ctc atc tcc tac acc agc aac act ttt cct 96
 Val Gly Lys Thr Cys Met Leu Ile Ser Tyr Thr Ser Asn Thr Phe Pro
 20 25 30

 acg gac tac gtg cca act gtc ttt gac aat ttc agt gca aat gtc gtt 144
 Thr Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val Val
 35 40 45

 gtg gat gga agc act gtg aat ctt ggg ttg tgg gat act gct ggc caa 192
 Val Asp Gly Ser Thr Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln
 50 55 60

 gaa gat tac aat aga ttg aga ccc tta agc tat cgt gga gca gat gta 240
 Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp Val
 65 70 75 80

 ttc ctg ctt gct ttc tct ctc ata agc agg gcc agc tat gaa aat gtt 288
 Phe Leu Leu Ala Phe Ser Leu Ile Ser Arg Ala Ser Tyr Glu Asn Val
 85 90 95

 gcc aag aaa tgg att cct gag ttg agg cat tat gct cct ggt gtt cca 336
 Ala Lys Lys Trp Ile Pro Glu Leu Arg His Tyr Ala Pro Gly Val Pro
 100 105 110

 att att ctt gtt gga aca aaa ctt gat ctt cgg gat gat aag cag ttc 384
 Ile Ile Leu Val Gly Thr Lys Leu Asp Leu Arg Asp Asp Lys Gln Phe
 115 120 125

 ttt caa gac cat cct ggt gca gtg cct atc acc aca gca cag ggt gag 432
 Phe Gln Asp His Pro Gly Ala Val Pro Ile Thr Thr Ala Gln Gly Glu
 130 135 140

 gaa ctg aga aag ctt atc ggt gct cca att tac att gaa tgt agt tca 480
 Glu Leu Arg Lys Leu Ile Gly Ala Pro Ile Tyr Ile Glu Cys Ser Ser
 145 150 155 160

 aaa aca caa cag aat gtg aag gct gtt ttt gat gca gcc atc aag gta 528
 Lys Thr Gln Gln Asn Val Lys Ala Val Phe Asp Ala Ala Ile Lys Val
 165 170 175

 gtt ctc cag ccc cca aag cag aag aaa aag aag aga aag gga caa aag 576
 Val Leu Gln Pro Pro Lys Gln Lys Lys Lys Lys Arg Lys Gly Gln Lys
 180 185 190

 gcc tgt tcc att ttg tga 594
 Ala Cys Ser Ile Leu
 195

<210> 22

<211> 197

<212> PRT

<213> Glycine max

<400> 22

23/291

Met Ser Ala Ser Arg Phe Ile Lys Cys Val Thr Val Gly Asp Gly Ala
 1 5 10 15
 Val Gly Lys Thr Cys Met Leu Ile Ser Tyr Thr Ser Asn Thr Phe Pro
 20 25 30
 Thr Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val Val
 35 40 45
 Val Asp Gly Ser Thr Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln
 50 55 60
 Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp Val
 65 70 75 80
 Phe Leu Leu Ala Phe Ser Leu Ile Ser Arg Ala Ser Tyr Glu Asn Val
 85 90 95
 Ala Lys Lys Trp Ile Pro Glu Leu Arg His Tyr Ala Pro Gly Val Pro
 100 105 110
 Ile Ile Leu Val Gly Thr Lys Leu Asp Leu Arg Asp Asp Lys Gln Phe
 115 120 125
 Phe Gln Asp His Pro Gly Ala Val Pro Ile Thr Thr Ala Gln Gly Glu
 130 135 140
 Glu Leu Arg Lys Leu Ile Gly Ala Pro Ile Tyr Ile Glu Cys Ser Ser
 145 150 155 160
 Lys Thr Gln Gln Asn Val Lys Ala Val Phe Asp Ala Ala Ile Lys Val
 165 170 175
 Val Leu Gln Pro Pro Lys Gln Lys Lys Lys Arg Lys Gly Gln Lys
 180 185 190
 Ala Cys Ser Ile Leu
 195

<210> 23

<211> 639

<212> DNA

<213> Glycine max

<220>

<221> CDS

<222> (1)...(639)

<223>

<400> 23
 atg gct tcc gca act gcc cca aga ttc atc aag tgc gtg acc gtt ggt 48
 Met Ala Ser Ala Thr Ala Pro Arg Phe Ile Lys Cys Val Thr Val Gly
 1 5 10 15
 gat gga gct gta ggg aag acc tgc atg ctc att tgc tat acc agc aac 96
 Asp Gly Ala Val Gly Lys Thr Cys Met Leu Ile Cys Tyr Thr Ser Asn
 20 25 30
 aaa ttc ccc acg gac tat atc ccc act gtg ttt gat aat ttc agt gca 144
 Lys Phe Pro Thr Asp Tyr Ile Pro Thr Val Phe Asp Asn Phe Ser Ala
 35 40 45
 aat gtg gtt gtt gaa ggc ata act gtc aac tta ggc ctt tgg gat aca 192
 Asn Val Val Val Glu Gly Ile Thr Val Asn Leu Gly Leu Trp Asp Thr
 50 55 60
 gct ggg caa gag gat tac aac agg ctg agg ccc ttg agc tac agg ggg 240
 Ala Gly Gln Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly
 65 70 75 80
 gca gat gtc ttt gtc ttg gct ttt tct tta gtt agt cgc gcg agc tat 288
 Ala Asp Val Phe Val Leu Ala Phe Ser Leu Val Ser Arg Ala Ser Tyr
 85 90 95
 gag aat gtg ctg aag aag tgg atc cct gaa ctc cag cat ttt gcc cct 336
 Glu Asn Val Leu Lys Lys Trp Ile Pro Glu Leu Gln His Phe Ala Pro
 100 105 110
 ggc atc ccg ttg gtg tta gtt ggc acc aaa ttg gat cta cga gaa gac 384
 Gly Ile Pro Leu Val Leu Val Gly Thr Lys Leu Asp Leu Arg Glu Asp
 115 120 125
 aag cac tac atg gct gat cat ccc agc ttg gtg cca gtg act act gat 432
 Lys His Tyr Met Ala Asp His Pro Ser Leu Val Pro Val Thr Thr Asp
 130 135 140
 caa ggt gag gaa ctc cgt aaa cac att gga gct acc tac tat att gag 480
 Gln Gly Glu Glu Leu Arg Lys His Ile Gly Ala Thr Tyr Tyr Ile Glu
 145 150 155 160
 tgc agc tca aaa act cag cag aat gtg aag gca gtt ttt gat gct gct 528
 Cys Ser Ser Lys Thr Gln Gln Asn Val Lys Ala Val Phe Asp Ala Ala
 165 170 175
 att aga atg gtc atc aag cct cca caa aag caa aac gag aaa aga aag 576
 Ile Arg Met Val Ile Lys Pro Pro Gln Lys Gln Asn Glu Lys Arg Lys
 180 185 190
 aaa aaa cca cgt ggc tgt ttc cta aac gtc ctc tgt cga agg aac att 624
 Lys Lys Pro Arg Gly Cys Phe Leu Asn Val Leu Cys Arg Arg Asn Ile
 195 200 205
 gtt cgc ctt aaa tga 639
 Val Arg Leu Lys
 210

<210> 24

<211> 212

<212> PRT

<213> Glycine max

<400> 24

Met. Ala Ser Ala Thr Ala Pro Arg Phe Ile Lys Cys Val Thr Val Gly
1 5 10 15

Asp Gly Ala Val Gly Lys Thr Cys Met Leu Ile Cys Tyr Thr Ser Asn
20 25 30

Lys Phe Pro Thr Asp Tyr Ile Pro Thr Val Phe Asp Asn Phe Ser Ala
35 40 45

Asn Val Val Val Glu Gly Ile Thr Val Asn Leu Gly Leu Trp Asp Thr
50 55 60

Ala Gly Gln Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly
65 70 75 80

Ala Asp Val Phe Val Leu Ala Phe Ser Leu Val Ser Arg Ala Ser Tyr
85 90 95

Glu Asn Val Leu Lys Lys Trp Ile Pro Glu Leu Gln His Phe Ala Pro
100 105 110

Gly Ile Pro Leu Val Leu Val Gly Thr Lys Leu Asp Leu Arg Glu Asp
115 120 125

Lys His Tyr Met Ala Asp His Pro Ser Leu Val Pro Val Thr Thr Asp
130 135 140

Gln Gly Glu Glu Leu Arg Lys His Ile Gly Ala Thr Tyr Tyr Ile Glu
145 150 155 160

Cys Ser Ser Lys Thr Gln Gln Asn Val Lys Ala Val Phe Asp Ala Ala
165 170 175

Ile Arg Met Val Ile Lys Pro Pro Gln Lys Gln Asn Glu Lys Arg Lys
180 185 190

Lys Lys Pro Arg Gly Cys Phe Leu Asn Val Leu Cys Arg Arg Asn Ile
195 200 205

Val Arg Leu Lys
210

<210> 25

<211> 762

<212> DNA

<213> Brassica napus

<220>

<221> CDS

<222> (1)..(762)

<223>

<400> 25
 atg gtt gga cca gga aga cct caa atc gtc ctc ttc ggt tca tca atc 48
 Met Val Gly Pro Gly Arg Pro Gln Ile Val Leu Phe Gly Ser Ser Ile
 1 5 10 15
 gtt caa tac agc ttc agc gat ggt gga tgg gga gcc act ctc gct aac 96
 Val Gln Tyr Ser Phe Ser Asp Gly Gly Trp Gly Ala Thr Leu Ala Asn
 20 25 30
 atc tac tct cgc acg gct gac gta atc ctt cgt ggg tat gct ggt tgg 144
 Ile Tyr Ser Arg Thr Ala Asp Val Ile Leu Arg Gly Tyr Ala Gly Trp
 35 40 45
 aac tcc aga tct gcc ttg aag gtg tta aac caa gtg ttc cca aag gat 192
 Asn Ser Arg Ser Ala Leu Lys Val Leu Asn Gln Val Phe Pro Lys Asp
 50 55 60
 gct gtt ata caa cct tct ttg gtg ata gtc tat ttc gga ggg aat gat 240
 Ala Val Ile Gln Pro Ser Leu Val Ile Val Tyr Phe Gly Gly Asn Asp
 65 70 75 80
 tca atg cct cct cat cca tca ggg caa gga cct cat gtt cct ctc tct 288
 Ser Met Pro Pro His Pro Ser Gly Gln Gly Pro His Val Pro Leu Ser
 85 90 95
 gaa ttc act gag aac atg agg aag atc gga gag cat ctt ttg agc ctc 336
 Glu Phe Thr Glu Asn Met Arg Lys Ile Gly Glu His Leu Leu Ser Leu
 100 105 110
 tcg gac aag acc cgt gtc att ttt ctc act ccc cca cca atg aac gag 384
 Ser Asp Lys Thr Arg Val Ile Phe Leu Thr Pro Pro Pro Met Asn Glu
 115 120 125
 aga caa atc caa cta gtg ttt gga gat gca atg aga ggc cgg agt aac 432
 Arg Gln Ile Gln Leu Val Phe Gly Asp Ala Met Arg Gly Arg Ser Asn
 130 135 140
 gag ctg tgt cgt cca tac gca gaa gcg ttg ttg aat cta tgc aga gag 480
 Glu Leu Cys Arg Pro Tyr Ala Glu Ala Leu Leu Asn Leu Cys Arg Glu
 145 150 155 160
 atc aat gtg aaa ggt atc gat ctt tgg aac gca ata cag caa caa gat 528
 Ile Asn Val Lys Gly Ile Asp Leu Trp Asn Ala Ile Gln Gln Gln Asp
 165 170 175
 gat tgg tta cac act tgc ttc act gac ggt atc cat ttc acg gcc aag 576
 Asp Trp Leu His Thr Cys Phe Thr Asp Gly Ile His Phe Thr Ala Lys
 180 185 190
 gcg agc gag att gtg gtg aag gag ata ttg aaa gta gtg aga gaa gct 624
 Ala Ser Glu Ile Val Val Lys Glu Ile Leu Lys Val Val Arg Glu Ala
 195 200 205
 gat tgg aaa ccg agt ctt gac agg aag tca tta ccg gtt gag ttt cca 672

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Asp	Trp	Lys	Pro	Ser	Leu	Asp	Arg	Lys	Ser	Leu	Pro	Val	Glu	Phe	Pro		
210						215					220						
ttt	gat	tct	ggt	cta	cca	aac	tcc	cca	aga	cat	agt	gat	cta	gaa	tta		720
Phe	Asp	Ser	Gly	Leu	Pro	Asn	Ser	Pro	Arg	His	Ser	Asp	Leu	Glu	Leu		
225					230					235				240			
act	aga	aac	aag	aag	ttg	gag	cct	cgt	atg	gcc	cga	ttg	taa				762
Thr	Arg	Asn	Lys	Lys	Leu	Glu	Pro	Arg	Met	Ala	Arg	Leu					
				245					250								

<210> 26

<211> 253

<212> PRT

<213> Brassica napus

<400> 26

Met	Val	Gly	Pro	Gly	Arg	Pro	Gln	Ile	Val	Leu	Phe	Gly	Ser	Ser	Ile		
1				5					10					15			
Val	Gln	Tyr	Ser	Phe	Ser	Asp	Gly	Gly	Trp	Gly	Ala	Thr	Leu	Ala	Asn		
			20					25					30				
Ile	Tyr	Ser	Arg	Thr	Ala	Asp	Val	Ile	Leu	Arg	Gly	Tyr	Ala	Gly	Trp		
	35						40					45					
Asn	Ser	Arg	Ser	Ala	Leu	Lys	Val	Leu	Asn	Gln	Val	Phe	Pro	Lys	Asp		
	50					55					60						
Ala	Val	Ile	Gln	Pro	Ser	Leu	Val	Ile	Val	Tyr	Phe	Gly	Gly	Asn	Asp		
65					70					75				80			
Ser	Met	Pro	Pro	His	Pro	Ser	Gly	Gln	Gly	Pro	His	Val	Pro	Leu	Ser		
				85					90					95			
Glu	Phe	Thr	Glu	Asn	Met	Arg	Lys	Ile	Gly	Glu	His	Leu	Leu	Ser	Leu		
			100					105					110				
Ser	Asp	Lys	Thr	Arg	Val	Ile	Phe	Leu	Thr	Pro	Pro	Pro	Met	Asn	Glu		
		115					120						125				
Arg	Gln	Ile	Gln	Leu	Val	Phe	Gly	Asp	Ala	Met	Arg	Gly	Arg	Ser	Asn		
	130						135					140					
Glu	Leu	Cys	Arg	Pro	Tyr	Ala	Glu	Ala	Leu	Leu	Asn	Leu	Cys	Arg	Glu		
145					150					155					160		
Ile	Asn	Val	Lys	Gly	Ile	Asp	Leu	Trp	Asn	Ala	Ile	Gln	Gln	Gln	Asp		
				165					170						175		

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Asp Trp Leu His Thr Cys Phe Thr Asp Gly Ile His Phe Thr Ala Lys
 180 185 190

Ala Ser Glu Ile Val Val Lys Glu Ile Leu Lys Val Val Arg Glu Ala
 195 200 205

Asp Trp Lys Pro Ser Leu Asp Arg Lys Ser Leu Pro Val Glu Phe Pro
 210 215 220

Phe Asp Ser Gly Leu Pro Asn Ser Pro Arg His Ser Asp Leu Glu Leu
 225 230 235 240

Thr Arg Asn Lys Lys Leu Glu Pro Arg Met Ala Arg Leu
 245 250

<210> 27

<211> 651

<212> DNA

<213> Brassica napus

<220>

<221> CDS

<222> (1)..(261)

<223>

<400> 27
 atg gct tca act gct tca aag ttc ata aaa tgt gtg act gtt ggt gat 48
 Met Ala Ser Thr Ala Ser Lys Phe Ile Lys Cys Val Thr Val Gly Asp
 1 5 10 15
 ggc gcc gta ggt aaa acc tgt atg ctc atc tgc tac acc agc aac aaa 96
 Gly Ala Val Gly Lys Thr Cys Met Leu Ile Cys Tyr Thr Ser Asn Lys
 20 25 30
 ttc cct act gac tac ata cca aca gtt ttt gac aac ttt agt gca aac 144
 Phe Pro Thr Asp Tyr Ile Pro Thr Val Phe Asp Asn Phe Ser Ala Asn
 35 40 45
 gtt gta gtt gaa ggc acc act gtg aac cta ggc cta tgg gac act gct 192
 Val Val Val Glu Gly Thr Thr Val Asn Leu Gly Leu Trp Asp Thr Ala
 50 55 60
 ggg caa gaa gac tac aac aga tta agg cct tta agt tac aga gga gca 240
 Gly Gln Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala
 65 70 75 80
 gat gtt ttc gtc ctg tct ttc tccttggtca gccgagctag ctacgagaat 291
 Asp Val Phe Val Leu Ser Phe
 85
 gtttataaaa agtggatccc tgaactccaa cactttgccc caggagtcc attagtcctt 351
 gttggtacca aactagatct ccgtgaagat aataagcatt atttggtga ccatacctgga 411

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ctatcccctg taactactgc acagggagag gaattgcgta agctaatacg tgcgacatat 471
 tacattgaat gtagctcgaa aactcaacag aatgtgaaag cagtttttga ttcagcgatc 531
 aaggaagtga tcaaaccggt ggttaaaciaa aaggagaaga cgcagaaaac gaagaagcaa 591
 aagtctaatac atggctgttt atcaaacggt ctgtgtggga ggatagtgac tcggcattga 651

<210> 28

<211> 87

<212> PRT

<213> Brassica napus

<400> 28

Met Ala Ser Thr Ala Ser Lys Phe Ile Lys Cys Val Thr Val Gly Asp
 1 5 10 15

Gly Ala Val Gly Lys Thr Cys Met Leu Ile Cys Tyr Thr Ser Asn Lys
 20 25 30

Phe Pro Thr Asp Tyr Ile Pro Thr Val Phe Asp Asn Phe Ser Ala Asn
 35 40 45

Val Val Val Glu Gly Thr Thr Val Asn Leu Gly Leu Trp Asp Thr Ala
 50 55 60

Gly Gln Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala
 65 70 75 80

Asp Val Phe Val Leu Ser Phe
 85

<210> 29

<211> 651

<212> DNA

<213> Brassica napus

<220>

<221> CDS

<222> (1)..(651)

<223>

<400> 29

atg gct tca agt gct tca aag ttc atc aaa tgt gta act gtt ggt gat 48

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Met	Ala	Ser	Ser	Ala	Ser	Lys	Phe	Ile	Lys	Cys	Val	Thr	Val	Gly	Asp	
1				5					10					15		
ggt gcc gtt ggt aaa acc tgt atg ctc atc tgc tat acc agc aac aag Gly Ala Val Gly Lys Thr Cys Met Leu Ile Cys Tyr Thr Ser Asn Lys																96
			20					25					30			
ttc cct act gac tat gta cca acg gtt ttt gac aac ttt agt gca aac Phe Pro Thr Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn																144
			35				40					45				
gtt gta gtt gaa gga act act gtg aac tta ggg cta tgg gat act gct Val Val Val Glu Gly Thr Thr Val Asn Leu Gly Leu Trp Asp Thr Ala																192
			50				55					60				
gga caa gaa gac tat aac aga tta agg cct tta agc tac aga gga gca Gly Gln Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala																240
			65			70			75						80	
gat gtc ttc gtc ttg tct ttc tca ttg gtt agc cga gct agc tac gag Asp Val Phe Val Leu Ser Phe Ser Leu Val Ser Arg Ala Ser Tyr Glu																288
				85				90						95		
aat gtt ttt aaa aag tgg atc cct gaa ctc caa cac ttt gct cca gga Asn Val Phe Lys Lys Trp Ile Pro Glu Leu Gln His Phe Ala Pro Gly																336
			100				105						110			
gtt cca tta gtt ctt gtc ggt acc aaa tta gat ctc cgt gag gat aag Val Pro Leu Val Leu Val Gly Thr Lys Leu Asp Leu Arg Glu Asp Lys																384
			115				120					125				
cat tat ctg gct gac cat cct gga cta tcc cct gta act act gca cag His Tyr Leu Ala Asp His Pro Gly Leu Ser Pro Val Thr Thr Ala Gln																432
			130				135					140				
gga gag gag ttg cgt aag ctc att ggt gca aca tat tac att gaa tgt Gly Glu Glu Leu Arg Lys Leu Ile Gly Ala Thr Tyr Tyr Ile Glu Cys																480
				150				155						160		
agc tca aaa act caa cag aat gtc aaa gca gtt ttt gat tcg gca atc Ser Ser Lys Thr Gln Gln Asn Val Lys Ala Val Phe Asp Ser Ala Ile																528
				165				170					175			
aag gaa gtg atc aaa ccg gtg ctt aaa cag aag ggc aag acc aag aaa Lys Glu Val Ile Lys Pro Val Leu Lys Gln Lys Gly Lys Thr Lys Lys																576
			180				185						190			
aag aag aag caa cag tcg aat cac cac ggg tgt tta tca aac gtt ttg Lys Lys Lys Gln Gln Ser Asn His His Gly Cys Leu Ser Asn Val Leu																624
			195				200					205				
tgt ggg agg ata gtg acc cgg cat tga Cys Gly Arg Ile Val Thr Arg His																651
			210				215									

<210> 30

<211> 216

<212> PRT

<213> Brassica napus

<400> 30

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Met Ala Ser Ser Ala Ser Lys Phe Ile Lys Cys Val Thr Val Gly Asp
 1 5 10 15

Gly Ala Val Gly Lys Thr Cys Met Leu Ile Cys Tyr Thr Ser Asn Lys
 20 25 30

Phe Pro Thr Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn
 35 40 45

Val Val Val Glu Gly Thr Thr Val Asn Leu Gly Leu Trp Asp Thr Ala
 50 55 60

Gly Gln Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala
 65 70 75 80

Asp Val Phe Val Leu Ser Phe Ser Leu Val Ser Arg Ala Ser Tyr Glu
 85 90 95

Asn Val Phe Lys Lys Trp Ile Pro Glu Leu Gln His Phe Ala Pro Gly
 100 105 110

Val Pro Leu Val Leu Val Gly Thr Lys Leu Asp Leu Arg Glu Asp Lys
 115 120 125

His Tyr Leu Ala Asp His Pro Gly Leu Ser Pro Val Thr Thr Ala Gln
 130 135 140

Gly Glu Glu Leu Arg Lys Leu Ile Gly Ala Thr Tyr Tyr Ile Glu Cys
 145 150 155 160

Ser Ser Lys Thr Gln Gln Asn Val Lys Ala Val Phe Asp Ser Ala Ile
 165 170 175

Lys Glu Val Ile Lys Pro Val Leu Lys Gln Lys Gly Lys Thr Lys Lys
 180 185 190

Lys Lys Lys Gln Gln Ser Asn His His Gly Cys Leu Ser Asn Val Leu
 195 200 205

Cys Gly Arg Ile Val Thr Arg His
 210 215

<210> 31

<211> 606

<212> DNA

<213> Brassica napus

<220>

<221> CDS

<222> (1)..(606)

<223>

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<400> 31
atg agc aca gcg aga ttc atc aag tgt gtg acg gtc gga gat gga gct      48
Met Ser Thr Ala Arg Phe Ile Lys Cys Val Thr Val Gly Asp Gly Ala
1          5          10          15

gtg ggg aag act tgt atg ctg att tca tat acc agc aat act ttt cct      96
Val Gly Lys Thr Cys Met Leu Ile Ser Tyr Thr Ser Asn Thr Phe Pro
          20          25          30

acg gat tac gtt ccg aca gtt ttt gac aat ttc agt gcg aat gtg gtg      144
Thr Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val Val
          35          40          45

gtc gat gga agt act gtc aac ctc ggc ctg tgg gat act gct ggg cag      192
Val Asp Gly Ser Thr Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln
          50          55          60

gaa gat tat aac agg ctt cgg cct ttg agt tac aga gga gca gat gtg      240
Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp Val
65          70          75          80

ttt tta ttg gca ttt tcc cta att agc aag gcc agt tac gag aac att      288
Phe Leu Leu Ala Phe Ser Leu Ile Ser Lys Ala Ser Tyr Glu Asn Ile
          85          90          95

tac aaa aag tgg ctt ccg gag ctg aaa cat tat gcg cct agc atc ccc      336
Tyr Lys Lys Trp Leu Pro Glu Leu Lys His Tyr Ala Pro Ser Ile Pro
          100          105          110

att gta ctc gtc gga acc aag tta gat ttg agg gat gac aaa cag ttc      384
Ile Val Leu Val Gly Thr Lys Leu Asp Leu Arg Asp Asp Lys Gln Phe
          115          120          125

ttg aaa gat cat cca gga gca gct tca ata aca act gcc cag gga gag      432
Leu Lys Asp His Pro Gly Ala Ala Ser Ile Thr Thr Ala Gln Gly Glu
          130          135          140

gaa tta aga aag atg att gga gcc atc aag tac tta gaa tgc agc tcc      480
Glu Leu Arg Lys Met Ile Gly Ala Ile Lys Tyr Leu Glu Cys Ser Ser
145          150          155          160

aaa acc cag cag aat gtg aag gca gtg ttt gat aca gcg atc cgg gta      528
Lys Thr Gln Gln Asn Val Lys Ala Val Phe Asp Thr Ala Ile Arg Val
          165          170          175

gcg ttg agg cct cca aag gca aag aag aag ata aag cca ttg agg acc      576
Ala Leu Arg Pro Pro Lys Ala Lys Lys Lys Ile Lys Pro Leu Arg Thr
          180          185          190

aaa aga tca aga aca tgc ttt ttc ttc taa      606
Lys Arg Ser Arg Thr Cys Phe Phe Phe
          195          200

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<210> 32

<211> 201

<212> PRT

<213> Brassica napus

<400> 32

Met Ser Thr Ala Arg Phe Ile Lys Cys Val Thr Val Gly Asp Gly Ala
1 5 10 15

Val Gly Lys Thr Cys Met Leu Ile Ser Tyr Thr Ser Asn Thr Phe Pro
20 25 30

Thr Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val Val
35 40 45

Val Asp Gly Ser Thr Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln
50 55 60

Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp Val
65 70 75 80

Phe Leu Leu Ala Phe Ser Leu Ile Ser Lys Ala Ser Tyr Glu Asn Ile
85 90 95

Tyr Lys Lys Trp Leu Pro Glu Leu Lys His Tyr Ala Pro Ser Ile Pro
100 105 110

Ile Val Leu Val Gly Thr Lys Leu Asp Leu Arg Asp Asp Lys Gln Phe
115 120 125

Leu Lys Asp His Pro Gly Ala Ala Ser Ile Thr Thr Ala Gln Gly Glu
130 135 140

Glu Leu Arg Lys Met Ile Gly Ala Ile Lys Tyr Leu Glu Cys Ser Ser
145 150 155 160

Lys Thr Gln Gln Asn Val Lys Ala Val Phe Asp Thr Ala Ile Arg Val
165 170 175

Ala Leu Arg Pro Pro Lys Ala Lys Lys Lys Ile Lys Pro Leu Arg Thr
180 185 190

Lys Arg Ser Arg Thr Cys Phe Phe Phe
195 200

<210> 33

<211> 636

<212> DNA

<213> Brassica napus

<220>

<221> CDS

<222> (1)..(636)

<223>

<400> 33

atg tca gct tca gtg gct gct gca tca gta tca aca aca aca aca gca	48
Met Ser Ala Ser Val Ala Ala Ser Val Ser Thr Thr Thr Thr Ala	
1 5 10 15	
gct aca acg ttt atc aag tgc gtc act gtt ggc gat gga gct gtg ggc	96
Ala Thr Thr Phe Ile Lys Cys Val Thr Val Gly Asp Gly Ala Val Gly	
20 25 30	
aaa act tgt ctt ctt atc tcc tac acc agc aac acc ttt cct act gat	144
Lys Thr Cys Leu Leu Ile Ser Tyr Thr Ser Asn Thr Phe Pro Thr Asp	
35 40 45	
tat gtt cct aca gtg ttc gac aac ttc agt gca aat gtt cta gtc gat	192
Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val Leu Val Asp	
50 55 60	
ggc aaa acc gtc aat ctt ggt ctt tgg gat act gct ggt caa gaa gat	240
Gly Lys Thr Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln Glu Asp	
65 70 75 80	
tac aat agg ctt aga cca ttg agt tac aga gga gca gat gtt ttc att	288
Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp Val Phe Ile	
85 90 95	
ctt gcc ttt tct ctt atc agc agg cct agc ttt gag aac att gct aaa	336
Leu Ala Phe Ser Leu Ile Ser Arg Pro Ser Phe Glu Asn Ile Ala Lys	
100 105 110	
aag tgg gtc cct gag ctg cga cat tat gcc cct aac gtg cct att gtt	384
Lys Trp Val Pro Glu Leu Arg His Tyr Ala Pro Asn Val Pro Ile Val	
115 120 125	
cta gtg gga act aaa tta gat cta aga gag gat aag aag ttc cca atg	432
Leu Val Gly Thr Lys Leu Asp Leu Arg Glu Asp Lys Lys Phe Pro Met	
130 135 140	
aac tat cca ggt gct tgc aca atc tca aca gaa caa ggt caa gag cta	480
Asn Tyr Pro Gly Ala Cys Thr Ile Ser Thr Glu Gln Gly Gln Glu Leu	
145 150 155 160	
aga aaa gag ata gga gca tta gca tat ata gag tgc agc tca aaa aca	528
Arg Lys Glu Ile Gly Ala Leu Ala Tyr Ile Glu Cys Ser Ser Lys Thr	
165 170 175	
caa cag aac gtg aaa gcg gtg ttt gat gca gcg ata aaa gta gtt cta	576
Gln Gln Asn Val Lys Ala Val Phe Asp Ala Ala Ile Lys Val Val Leu	
180 185 190	
cag cct cct aca aaa att aag aaa caa aag aga aga ttt cgt ttc tgc	624
Gln Pro Pro Thr Lys Ile Lys Lys Gln Lys Arg Arg Phe Arg Phe Cys	
195 200 205	
cat gct ctc tga	636
His Ala Leu	
210	

<210> 34

<211> 211

<212> PRT

<213> Brassica napus

<400> 34

Met Ser Ala Ser Val Ala Ala Ala Ser Val Ser Thr Thr Thr Thr Ala
1 5 10 15

Ala Thr Thr Phe Ile Lys Cys Val Thr Val Gly Asp Gly Ala Val Gly
20 25 30

Lys Thr Cys Leu Leu Ile Ser Tyr Thr Ser Asn Thr Phe Pro Thr Asp
35 40 45

Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val Leu Val Asp
50 55 60

Gly Lys Thr Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln Glu Asp
65 70 75 80

Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp Val Phe Ile
85 90 95

Leu Ala Phe Ser Leu Ile Ser Arg Pro Ser Phe Glu Asn Ile Ala Lys
100 105 110

Lys Trp Val Pro Glu Leu Arg His Tyr Ala Pro Asn Val Pro Ile Val
115 120 125

Leu Val Gly Thr Lys Leu Asp Leu Arg Glu Asp Lys Lys Phe Pro Met
130 135 140

Asn Tyr Pro Gly Ala Cys Thr Ile Ser Thr Glu Gln Gly Gln Glu Leu
145 150 155 160

Arg Lys Glu Ile Gly Ala Leu Ala Tyr Ile Glu Cys Ser Ser Lys Thr
165 170 175

Gln Gln Asn Val Lys Ala Val Phe Asp Ala Ala Ile Lys Val Val Leu
180 185 190

Gln Pro Pro Thr Lys Ile Lys Lys Gln Lys Arg Arg Phe Arg Phe Cys
195 200 205

His Ala Leu
210

<210> 35

<211> 588

<212> DNA

<213> Brassica napus

<220>

<221> CDS

<222> (1)..(588)

<223>

<400> 35

atg agc gct tgc agg ttc ata aag tgt gtc acc gtc ggc gat ggt gcc	48
Met Ser Ala Ser Arg Phe Ile Lys Cys Val Thr Val Gly Asp Gly Ala	
1 5 10 15	
gtc gga aaa acc tgt atg ctg atc tct tac acg agc aac acc ttc cct	96
Val Gly Lys Thr Cys Met Leu Ile Ser Tyr Thr Ser Asn Thr Phe Pro	
20 25 30	
acg gac tat gta cca act gtt ttc gat aac ttc agt gct aat gtg gtt	144
Thr Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val Val	
35 40 45	
gtt gat ggg aac act gtg aat ctt ggc ttg tgg gat aca gct ggt caa	192
Val Asp Gly Asn Thr Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln	
50 55 60	
gaa gac tat aac agg tta aga cca ttg agt tac cgt ggt gcg gat gtc	240
Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp Val	
65 70 75 80	
ttc att ctt gct ttc tct ctt atc agc aaa gct agc tac gag aat ata	288
Phe Ile Leu Ala Phe Ser Leu Ile Ser Lys Ala Ser Tyr Glu Asn Ile	
85 90 95	
gct aag aag tgg att cct gag ctg agg cac tat gcc cct ggt gtt cct	336
Ala Lys Lys Trp Ile Pro Glu Leu Arg His Tyr Ala Pro Gly Val Pro	
100 105 110	
att atc ctg gtt gga aca aaa ctg gat ctt cga gat gac aag cag ttc	384
Ile Ile Leu Val Gly Thr Lys Leu Asp Leu Arg Asp Asp Lys Gln Phe	
115 120 125	
ttc ata gac cac cct ggt gca gtg ccg att agt act aac cag gga gag	432
Phe Ile Asp His Pro Gly Ala Val Pro Ile Ser Thr Asn Gln Gly Glu	
130 135 140	
gaa cta aag aaa ctg ata ggg tct ccg gct tac att gaa tgc agt tca	480
Glu Leu Lys Lys Leu Ile Gly Ser Pro Ala Tyr Ile Glu Cys Ser Ser	
145 150 155 160	
aag acg cag cag aac gtg aag gca gtc ttt gac gca gcc ata aaa gta	528
Lys Thr Gln Gln Asn Val Lys Ala Val Phe Asp Ala Ala Ile Lys Val	
165 170 175	
gtg ctt cag cca cca aag caa aag aag aag aaa aag aag aat ggt tgt	576
Val Leu Gln Pro Pro Lys Gln Lys Lys Lys Lys Lys Asn Gly Cys	
180 185 190	

gtt ttc ttg tga
Val Phe Leu
195

<210> 36

<211> 195

<212> PRT

<213> Brassica napus

<400> 36

Met Ser Ala Ser Arg Phe Ile Lys Cys Val Thr Val Gly Asp Gly Ala
1 5 10 15

Val Gly Lys Thr Cys Met Leu Ile Ser Tyr Thr Ser Asn Thr Phe Pro
20 25 30

Thr Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val Val
35 40 45

Val Asp Gly Asn Thr Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln
50 55 60

Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp Val
65 70 75 80

Phe Ile Leu Ala Phe Ser Leu Ile Ser Lys Ala Ser Tyr Glu Asn Ile
85 90 95

Ala Lys Lys Trp Ile Pro Glu Leu Arg His Tyr Ala Pro Gly Val Pro
100 105 110

Ile Ile Leu Val Gly Thr Lys Leu Asp Leu Arg Asp Asp Lys Gln Phe
115 120 125

Phe Ile Asp His Pro Gly Ala Val Pro Ile Ser Thr Asn Gln Gly Glu
130 135 140

Glu Leu Lys Lys Leu Ile Gly Ser Pro Ala Tyr Ile Glu Cys Ser Ser
145 150 155 160

Lys Thr Gln Gln Asn Val Lys Ala Val Phe Asp Ala Ala Ile Lys Val
165 170 175

Val Leu Gln Pro Pro Lys Gln Lys Lys Lys Lys Lys Asn Gly Cys
180 185 190

Val Phe Leu
195

<210> 37

<211> 594

<212> DNA

<213> Brassica napus

<220>

<221> CDS

<222> (1)..(594)

<223>

<400> 37

atg agc gca tcg agg ttc ata aag tgt gtg acc gtt ggt gac gga gct	48
Met Ser Ala Ser Arg Phe Ile Lys Cys Val Thr Val Gly Asp Gly Ala	
1 5 10 15	
gtg ggt aaa aca tgt ctc ctc att tct tac acc agc aac act ttc cct	96
Val Gly Lys Thr Cys Leu Leu Ile Ser Tyr Thr Ser Asn Thr Phe Pro	
20 25 30	
acg gat tat gtt ccg act gtt ttt gat aac ttc agc gct aat gtg gtt	144
Thr Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val Val	
35 40 45	
gtt aac gga gcc act gtc aac ctt ggc ttg tgg gat acc gct ggg cag	192
Val Asn Gly Ala Thr Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln	
50 55 60	
gag gat tat aac agg tta aga cca ttg agt tac cgc ggt gct gat gtt	240
Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp Val	
65 70 75 80	
ttc atc tta gcc ttc tcc ctc atc agt aag gct agt tat gag aat gtc	288
Phe Ile Leu Ala Phe Ser Leu Ile Ser Lys Ala Ser Tyr Glu Asn Val	
85 90 95	
tcc aag aag tgg atc cct gag ctg act cac tat gcc cct ggt gtc cca	336
Ser Lys Lys Trp Ile Pro Glu Leu Thr His Tyr Ala Pro Gly Val Pro	
100 105 110	
att gtt ctt gtt ggt acc aaa cta gat ctt agg gat gac aaa cag ttc	384
Ile Val Leu Val Gly Thr Lys Leu Asp Leu Arg Asp Asp Lys Gln Phe	
115 120 125	
ttc gtt gac cac cct ggt gct gta cct att acc act gct cag gga gag	432
Phe Val Asp His Pro Gly Ala Val Pro Ile Thr Thr Ala Gln Gly Glu	
130 135 140	
gaa ctg atg aag cta att gga gct cct tcg tac atc gag tgc agt tca	480
Glu Leu Met Lys Leu Ile Gly Ala Pro Ser Tyr Ile Glu Cys Ser Ser	
145 150 155 160	
aaa tca cag gag aac gtg aag ggg gtg ttt gat gca gcg att aga gtg	528
Lys Ser Gln Glu Asn Val Lys Gly Val Phe Asp Ala Ala Ile Arg Val	
165 170 175	
gta ctt caa cct cca aag cag aag aaa aag aag ggc aaa gta caa aag	576

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Val Leu Gln Pro Pro Lys Gln Lys Lys Lys Gly Lys Val Gln Lys
 180 185 190

gcc tgc tcc att ttg taa
 Ala Cys Ser Ile Leu
 195

594

<210> 38

<211> 197

<212> PRT

<213> Brassica napus

<400> 38

Met Ser Ala Ser Arg Phe Ile Lys Cys Val Thr Val Gly Asp Gly Ala
 1 5 10 15

Val Gly Lys Thr Cys Leu Leu Ile Ser Tyr Thr Ser Asn Thr Phe Pro
 20 25 30

Thr Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val Val
 35 40 45

Val Asn Gly Ala Thr Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln
 50 55 60

Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp Val
 65 70 75 80

Phe Ile Leu Ala Phe Ser Leu Ile Ser Lys Ala Ser Tyr Glu Asn Val
 85 90 95

Ser Lys Lys Trp Ile Pro Glu Leu Thr His Tyr Ala Pro Gly Val Pro
 100 105 110

Ile Val Leu Val Gly Thr Lys Leu Asp Leu Arg Asp Asp Lys Gln Phe
 115 120 125

Phe Val Asp His Pro Gly Ala Val Pro Ile Thr Thr Ala Gln Gly Glu
 130 135 140

Glu Leu Met Lys Leu Ile Gly Ala Pro Ser Tyr Ile Glu Cys Ser Ser
 145 150 155 160

Lys Ser Gln Glu Asn Val Lys Gly Val Phe Asp Ala Ala Ile Arg Val
 165 170 175

Val Leu Gln Pro Pro Lys Gln Lys Lys Lys Lys Gly Lys Val Gln Lys
 180 185 190

Ala Cys Ser Ile Leu
195

<210> 39

<211> 645

<212> DNA

<213> Oryza sativa

<220>

<221> CDS

<222> (1)..(645)

<223>

<400> 39
atg agc tcg gcg gcg gcg gcg acg agg ttc atc aag tgc gtc acc gtg 48
Met Ser Ser Ala Ala Ala Ala Thr Arg Phe Ile Lys Cys Val Thr Val
1 5 10 15
ggg gac ggc gcg gtg ggg aag acg tgc atg ctc atc tgc tac acc tgc 96
Gly Asp Gly Ala Val Gly Lys Thr Cys Met Leu Ile Cys Tyr Thr Cys
20 25 30
aac aag ttc ccc acc gat tac atc ccc acc gtg ttc gac aac ttc agc 144
Asn Lys Phe Pro Thr Asp Tyr Ile Pro Thr Val Phe Asp Asn Phe Ser
35 40 45
gcc aat gtc tcc gtg gac ggg agc gtc gtc aac ctc ggc ctc tgg gac 192
Ala Asn Val Ser Val Asp Gly Ser Val Val Asn Leu Gly Leu Trp Asp
50 55 60
act gca ggt cag gag gat tac agc agg ttg agg cct ctg agc tac agg 240
Thr Ala Gly Gln Glu Asp Tyr Ser Arg Leu Arg Pro Leu Ser Tyr Arg
65 70 75 80
gga gcc gat gtg ttc atc ctg tcc ttc tcc ctg ata agc agg gcg agc 288
Gly Ala Asp Val Phe Ile Leu Ser Phe Ser Leu Ile Ser Arg Ala Ser
85 90 95
tat gag aat gtt cag aag aag tgg atg cca gag ctt cgc cgg ttt gcg 336
Tyr Glu Asn Val Gln Lys Lys Trp Met Pro Glu Leu Arg Arg Phe Ala
100 105 110
cct ggt gtt cct gta gtt ctt gtt gga acc aag ttg gat ctc cgt gaa 384
Pro Gly Val Pro Val Val Leu Val Gly Thr Lys Leu Asp Leu Arg Glu
115 120 125
gat agg gcc tat ctt gct gat cat cca gct tct tcc ata ata aca acg 432
Asp Arg Ala Tyr Leu Ala Asp His Pro Ala Ser Ser Ile Ile Thr Thr
130 135 140
gag cag gga gaa gaa ctg agg aag cta ata gga gcg gtc gcc tac atc 480
Glu Gln Gly Glu Glu Leu Arg Lys Leu Ile Gly Ala Val Ala Tyr Ile
145 150 155 160
gaa tgc agc tcc aag aca cag aga aac att aaa gct gtt ttc gac act 528
Glu Cys Ser Ser Lys Thr Gln Arg Asn Ile Lys Ala Val Phe Asp Thr
165 170 175

gcc atc aaa gtg gtg ctt caa cct cca aga cat aag gat gta acc aga 576
 Ala Ile Lys Val Val Leu Gln Pro Pro Arg His Lys Asp Val Thr Arg
 180 185 190

aag aaa ctc caa tca agc tcc aat cgg cca gta agg cgg tac ttt tgc 624
 Lys Lys Leu Gln Ser Ser Ser Asn Arg Pro Val Arg Arg Tyr Phe Cys
 195 200 205

gga agc gct tgt ttc gcg tag 645
 Gly Ser Ala Cys Phe Ala
 210

<210> 40

<211> 214

<212> PRT

<213> Oryza sativa

<400> 40

Met Ser Ser Ala Ala Ala Ala Thr Arg Phe Ile Lys Cys Val Thr Val
 1 5 10 15

Gly Asp Gly Ala Val Gly Lys Thr Cys Met Leu Ile Cys Tyr Thr Cys
 20 25 30

Asn Lys Phe Pro Thr Asp Tyr Ile Pro Thr Val Phe Asp Asn Phe Ser
 35 40 45

Ala Asn Val Ser Val Asp Gly Ser Val Val Asn Leu Gly Leu Trp Asp
 50 55 60

Thr Ala Gly Gln Glu Asp Tyr Ser Arg Leu Arg Pro Leu Ser Tyr Arg
 65 70 75 80

Gly Ala Asp Val Phe Ile Leu Ser Phe Ser Leu Ile Ser Arg Ala Ser
 85 90 95

Tyr Glu Asn Val Gln Lys Lys Trp Met Pro Glu Leu Arg Arg Phe Ala
 100 105 110

Pro Gly Val Pro Val Val Leu Val Gly Thr Lys Leu Asp Leu Arg Glu
 115 120 125

Asp Arg Ala Tyr Leu Ala Asp His Pro Ala Ser Ser Ile Ile Thr Thr
 130 135 140

Glu Gln Gly Glu Glu Leu Arg Lys Leu Ile Gly Ala Val Ala Tyr Ile
 145 150 155 160

Glu Cys Ser Ser Lys Thr Gln Arg Asn Ile Lys Ala Val Phe Asp Thr
 165 170 175

Ala Ile Lys Val Val Leu Gln Pro Pro Arg His Lys Asp Val Thr Arg
 180 185 190

Lys Lys Leu Gln Ser Ser Ser Asn Arg Pro Val Arg Arg Tyr Phe Cys
 195 200 205

Gly Ser Ala Cys Phe Ala
 210

<210> 41

<211> 645

<212> DNA

<213> Oryza sativa

<220>

<221> CDS

<222> (1)..(645)

<223>

<400> 41
 atg agc ggc gcc acc aag ttc atc aag tgc gtc acc gtc ggc gac ggc 48
 Met Ser Gly Ala Thr Lys Phe Ile Lys Cys Val Thr Val Gly Asp Gly
 1 5 10 15
 gcc gtc ggc aag acc tgc atg ctc atc tgc tac atc agc aac aag ttc 96
 Ala Val Gly Lys Thr Cys Met Leu Ile Cys Tyr Ile Ser Asn Lys Phe
 20 25 30
 ccc acc gat tac atc ccc acc gtg ttc gac aac ttc agt gct aat gtt 144
 Pro Thr Asp Tyr Ile Pro Thr Phe Asp Asn Phe Ser Ala Asn Val
 35 40 45
 tca gtg gat ggg aac atc gtc aac ttg gga tta tgg gac act gct gga 192
 Ser Val Asp Gly Asn Ile Val Asn Leu Gly Leu Trp Asp Thr Ala Gly
 50 55 60
 caa gag gat tac agc agg ctg agg cca ctg agc tac agg gga gcg gat 240
 Gln Glu Asp Tyr Ser Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp
 65 70 75 80
 ata ttt gtg ctg gca ttc tca ctg atc agc aga gca agc tat gag aat 288
 Ile Phe Val Leu Ala Phe Ser Leu Ile Ser Arg Ala Ser Tyr Glu Asn
 85 90 95
 gtt ctc aag aag tgg atg ccg gag ctt cgc cgg ttc gca ccg aat gtt 336
 Val Leu Lys Lys Trp Met Pro Glu Leu Arg Arg Phe Ala Pro Asn Val
 100 105 110
 cca att gtt ctt gtt ggg acc aag tta gat cta cgt gac cac aga tct 384
 Pro Ile Val Leu Val Gly Thr Lys Leu Asp Leu Arg Asp His Arg Ser
 115 120 125
 tac ctt gcg gac cat cct gct gct tcc gca att acg act gca cag ggt 432

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Tyr	Leu	Ala	Asp	His	Pro	Ala	Ala	Ser	Ala	Ile	Thr	Thr	Ala	Gln	Gly		
130						135					140						
gaa	gaa	ctt	aga	aag	cag	ata	ggc	gcc	gcg	gct	tac	atc	gaa	tgc	agt	480	
Glu	Glu	Leu	Arg	Lys	Gln	Ile	Gly	Ala	Ala	Ala	Tyr	Ile	Glu	Cys	Ser		
145					150					155					160		
tcg	aaa	aca	caa	cag	aac	atc	aag	gcc	gtg	ttt	gat	act	gcc	atc	aag	528	
Ser	Lys	Thr	Gln	Gln	Asn	Ile	Lys	Ala	Val	Phe	Asp	Thr	Ala	Ile	Lys		
				165					170						175		
gtg	gtc	ctt	cag	cct	cct	cgg	aga	agg	ggg	gag	acg	acg	atg	gca	agg	576	
Val	Val	Leu	Gln	Pro	Pro	Arg	Arg	Arg	Gly	Glu	Thr	Thr	Met	Ala	Arg		
			180					185						190			
aag	aag	aca	agg	cga	agc	acc	ggc	tgc	tcg	tta	aag	aac	ttg	atg	tgt	624	
Lys	Lys	Thr	Arg	Arg	Ser	Thr	Gly	Cys	Ser	Leu	Lys	Asn	Leu	Met	Cys		
		195					200					205					
ggc	agt	gca	tgt	gtt	gtt	tag										645	
Gly	Ser	Ala	Cys	Val	Val												
210																	

<210> 42

<211> 214

<212> PRT

<213> Oryza sativa

<400> 42

Met	Ser	Gly	Ala	Thr	Lys	Phe	Ile	Lys	Cys	Val	Thr	Val	Gly	Asp	Gly		
1				5					10					15			
Ala	Val	Gly	Lys	Thr	Cys	Met	Leu	Ile	Cys	Tyr	Ile	Ser	Asn	Lys	Phe		
			20					25						30			
Pro	Thr	Asp	Tyr	Ile	Pro	Thr	Val	Phe	Asp	Asn	Phe	Ser	Ala	Asn	Val		
		35					40						45				
Ser	Val	Asp	Gly	Asn	Ile	Val	Asn	Leu	Gly	Leu	Trp	Asp	Thr	Ala	Gly		
		50				55					60						
Gln	Glu	Asp	Tyr	Ser	Arg	Leu	Arg	Pro	Leu	Ser	Tyr	Arg	Gly	Ala	Asp		
65					70					75					80		
Ile	Phe	Val	Leu	Ala	Phe	Ser	Leu	Ile	Ser	Arg	Ala	Ser	Tyr	Glu	Asn		
				85					90						95		
Val	Leu	Lys	Lys	Trp	Met	Pro	Glu	Leu	Arg	Arg	Phe	Ala	Pro	Asn	Val		
			100					105						110			
Pro	Ile	Val	Leu	Val	Gly	Thr	Lys	Leu	Asp	Leu	Arg	Asp	His	Arg	Ser		
			115				120					125					

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Tyr Leu Ala Asp His Pro Ala Ala Ser Ala Ile Thr Thr Ala Gln Gly
 130 135 140

Glu Glu Leu Arg Lys Gln Ile Gly Ala Ala Ala Tyr Ile Glu Cys Ser
 145 150 155 160

Ser Lys Thr Gln Gln Asn Ile Lys Ala Val Phe Asp Thr Ala Ile Lys
 165 170 175

Val Val Leu Gln Pro Pro Arg Arg Arg Gly Glu Thr Thr Met Ala Arg
 180 185 190

Lys Lys Thr Arg Arg Ser Thr Gly Cys Ser Leu Lys Asn Leu Met Cys
 195 200 205

Gly Ser Ala Cys Val Val
 210

<210> 43

<211> 639

<212> DNA

<213> Oryza sativa

<220>

<221> CDS

<222> (1)..(639)

<223>

<400> 43		
atg ggc tcg aag ccg ccg ccg ccg ccg cag ccc agc gtc tcc ttc aag		48
Met Gly Ser Lys Pro Pro Pro Pro Gln Pro Ser Val Ser Phe Lys		
1 5 10 15		
ctc gtc ctc ctc ggc gac ggg aga gta ggc aaa aca tct ctt gtg ctg		96
Leu Val Leu Leu Gly Asp Gly Arg Val Gly Lys Thr Ser Leu Val Leu		
20 25 30		
cgg tat gtg aat gat gtc ttc tca gac aaa cag gaa gca act gtt caa		144
Arg Tyr Val Asn Asp Val Phe Ser Asp Lys Gln Glu Ala Thr Val Gln		
35 40 45		
gct tca tat ttg aca aag cgc ctt gtt gtt gaa ggt gtg cct att acg		192
Ala Ser Tyr Leu Thr Lys Arg Leu Val Val Glu Gly Val Pro Ile Thr		
50 55 60		
ctc tct atc tgg gat aca gct gga caa gag aag ttc cat gca cta ggc		240
Leu Ser Ile Trp Asp Thr Ala Gly Gln Glu Lys Phe His Ala Leu Gly		
65 70 75 80		
cct ata tac tat cgt gat gca gac gct gct ctt tta gta tat gac atc		288
Pro Ile Tyr Tyr Arg Asp Ala Asp Ala Ala Leu Leu Val Tyr Asp Ile		
85 90 95		

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aca gac aat gat act ttt ctt cgt gtc aca aag tgg gtg aaa gag ctt 336
 Thr Asp Asn Asp Thr Phe Leu Arg Val Thr Lys Trp Val Lys Glu Leu
 100 105 110
 aag caa atg gca aat aaa gat att gtt atg gcc att gca gca aat aaa 384
 Lys Gln Met Ala Asn Lys Asp Ile Val Met Ala Ile Ala Ala Asn Lys
 115 120 125
 agt gac ctg gtt aga tca aaa cac ata gac act aat gaa gca gca agc 432
 Ser Asp Leu Val Arg Ser Lys His Ile Asp Thr Asn Glu Ala Ala Ser
 130 135 140
 tat gca gaa agt att ggg gca act ctc ttt gtt act tct gcc aaa gct 480
 Tyr Ala Glu Ser Ile Gly Ala Thr Leu Phe Val Thr Ser Ala Lys Ala
 145 150 155 160
 ggt act ggg att gat gat atc ttc agt gac ata gcc aag aga tta tta 528
 Gly Thr Gly Ile Asp Asp Ile Phe Ser Asp Ile Ala Lys Arg Leu Leu
 165 170 175
 gag aga aga aaa aac agc tcc gat ggc ttg tca ctg gct cat cca aag 576
 Glu Arg Arg Lys Asn Ser Ser Asp Gly Leu Ser Leu Ala His Pro Lys
 180 185 190
 aaa ggc att tta atc gtc gac gat gaa cct gag aaa gaa cct cca cca 624
 Lys Gly Ile Leu Ile Val Asp Asp Glu Pro Glu Lys Glu Pro Pro Pro
 195 200 205
 aag tgc tgc tca tag 639
 Lys Cys Cys Ser
 210

<210> 44

<211> 212

<212> PRT

<213> Oryza sativa

<400> 44

Met Gly Ser Lys Pro Pro Pro Pro Pro Gln Pro Ser Val Ser Phe Lys
 1 5 10 15
 Leu Val Leu Leu Gly Asp Gly Arg Val Gly Lys Thr Ser Leu Val Leu
 20 25 30
 Arg Tyr Val Asn Asp Val Phe Ser Asp Lys Gln Glu Ala Thr Val Gln
 35 40 45
 Ala Ser Tyr Leu Thr Lys Arg Leu Val Val Glu Gly Val Pro Ile Thr
 50 55 60
 Leu Ser Ile Trp Asp Thr Ala Gly Gln Glu Lys Phe His Ala Leu Gly
 65 70 75 80
 Pro Ile Tyr Tyr Arg Asp Ala Asp Ala Ala Leu Leu Val Tyr Asp Ile
 85 90 95

Thr Asp Asn Asp Thr Phe Leu Arg Val Thr Lys Trp Val Lys Glu Leu
 100 105 110

Lys Gln Met Ala Asn Lys Asp Ile Val Met Ala Ile Ala Ala Asn Lys
 115 120 125

Ser Asp Leu Val Arg Ser Lys His Ile Asp Thr Asn Glu Ala Ala Ser
 130 135 140

Tyr Ala Glu Ser Ile Gly Ala Thr Leu Phe Val Thr Ser Ala Lys Ala
 145 150 155 160

Gly Thr Gly Ile Asp Asp Ile Phe Ser Asp Ile Ala Lys Arg Leu Leu
 165 170 175

Glu Arg Arg Lys Asn Ser Ser Asp Gly Leu Ser Leu Ala His Pro Lys
 180 185 190

Lys Gly Ile Leu Ile Val Asp Asp Glu Pro Glu Lys Glu Pro Pro Pro
 195 200 205

Lys Cys Cys Ser
 210

<210> 45

<211> 806

<212> DNA

<213> Brassica napus

<220>

<221> CDS

<222> (6)..(596)

<223>

<400> 45
 ggaaa atg agc gca tct cgg ttc ata aag tgc gtg acg gtc ggt gac gga 50
 Met Ser Ala Ser Arg Phe Ile Lys Cys Val Thr Val Gly Asp Gly 15
 1 5 10
 gca gtg ggc aaa aca tgt ctc ctc atc tct tac acc agc aac act ttc 98
 Ala Val Gly Lys Thr Cys Leu Leu Ile Ser Tyr Thr Ser Asn Thr Phe 20 25 30
 cct acg gat tat gtg ccc act gtt ttc gat aac ttt agc gct aac gtt 146
 Pro Thr Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val 35 40 45
 gtt gtt aac gga gcc act gtc aac tta gga ctc tgg gat aca gca ggg 194

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Val	Val	Asn	Gly	Ala	Thr	Val	Asn	Leu	Gly	Leu	Trp	Asp	Thr	Ala	Gly		
		50					55					60					
cag	gag	gat	tat	aac	aga	ttg	aga	ccc	ttg	agt	tac	cgc	ggg	gct	gac		242
Gln	Glu	Asp	Tyr	Asn	Arg	Leu	Arg	Pro	Leu	Ser	Tyr	Arg	Gly	Ala	Asp		
		65				70					75						
ggt	ttc	atc	tta	gcc	ttc	tct	ctt	atc	agt	aag	gct	agt	tat	gag	aat		290
Val	Phe	Ile	Leu	Ala	Phe	Ser	Leu	Ile	Ser	Lys	Ala	Ser	Tyr	Glu	Asn		
					85					90					95		
gtc	tcc	aag	aag	tgg	atc	cct	gag	ctg	acc	cac	tat	gcc	cct	ggg	gtc		338
Val	Ser	Lys	Lys	Trp	Ile	Pro	Glu	Leu	Thr	His	Tyr	Ala	Pro	Gly	Val		
				100					105					110			
cct	att	ggt	ctt	ggt	gga	acc	aaa	cta	gat	ctt	agg	gat	gac	aaa	cag		386
Pro	Ile	Val	Leu	Val	Gly	Thr	Lys	Leu	Asp	Leu	Arg	Asp	Asp	Lys	Gln		
			115					120					125				
ttc	ttc	ggt	gac	cac	cct	ggg	gct	gta	cct	att	acc	act	gct	cag	ggc		434
Phe	Phe	Val	Asp	His	Pro	Gly	Ala	Val	Pro	Ile	Thr	Thr	Ala	Gln	Gly		
		130					135					140					
gag	gaa	cta	atg	aag	cta	att	gga	gct	cct	tcg	tac	atc	gag	tgc	agc		482
Glu	Glu	Leu	Met	Lys	Leu	Ile	Gly	Ala	Pro	Ser	Tyr	Ile	Glu	Cys	Ser		
		145				150					155						
tca	aaa	tca	cag	gag	aac	gtg	aag	ggg	gtg	ttt	gat	gca	gcg	atc	aga		530
Ser	Lys	Ser	Gln	Glu	Asn	Val	Lys	Gly	Val	Phe	Asp	Ala	Ala	Ile	Arg		
					165					170					175		
gtg	gta	ctt	caa	cct	cca	aag	cag	aag	aaa	aag	agc	aaa	gct	caa			578
Val	Val	Leu	Gln	Pro	Pro	Lys	Gln	Lys	Lys	Lys	Ser	Lys	Ala	Gln			
				180				185					190				
aag	gcc	tgc	tcc	att	ttg	tgattttctct	acgctcatct	ctcttcact									626
Lys	Ala	Cys	Ser	Ile	Leu												
				195													
ctctagtga	ggcttaagaa	gaagaaacac	tttagccttt	aagatttggt	tcagagttcg												686
ttgtgataag	cctcgcttaa	tccttagaaa	cgattacttc	tggttttact	gataaagagc												746
ttccagcttt	atagctgaga	gctaattattg	cactaccact	ataaaaaaaaa	aaaaaaaaaa												806

<210> 46

<211> 197

<212> PRT

<213> Brassica napus

<400> 46

Met	Ser	Ala	Ser	Arg	Phe	Ile	Lys	Cys	Val	Thr	Val	Gly	Asp	Gly	Ala		
1				5					10					15			
Val	Gly	Lys	Thr	Cys	Leu	Leu	Ile	Ser	Tyr	Thr	Ser	Asn	Thr	Phe	Pro		
			20					25					30				
Thr	Asp	Tyr	Val	Pro	Thr	Val	Phe	Asp	Asn	Phe	Ser	Ala	Asn	Val	Val		
		35				40						45					

Val Asn Gly Ala Thr Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln
 50 55 60
 Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp Val
 65 70 75 80
 Phe Ile Leu Ala Phe Ser Leu Ile Ser Lys Ala Ser Tyr Glu Asn Val
 85 90 95
 Ser Lys Lys Trp Ile Pro Glu Leu Thr His Tyr Ala Pro Gly Val Pro
 100 105 110
 Ile Val Leu Val Gly Thr Lys Leu Asp Leu Arg Asp Asp Lys Gln Phe
 115 120 125
 Phe Val Asp His Pro Gly Ala Val Pro Ile Thr Thr Ala Gln Gly Glu
 130 135 140
 Glu Leu Met Lys Leu Ile Gly Ala Pro Ser Tyr Ile Glu Cys Ser Ser
 145 150 155 160
 Lys Ser Gln Glu Asn Val Lys Gly Val Phe Asp Ala Ala Ile Arg Val
 165 170 175
 Val Leu Gln Pro Pro Lys Gln Lys Lys Lys Lys Ser Lys Ala Gln Lys
 180 185 190
 Ala Cys Ser Ile Leu
 195

<210> 47

<211> 32

<212> PRT

<213> consensus

<220>

<221> MISC_FEATURE

<222> (1)..(32)

<223> Xaa in position 15 is Leu, Ile or Met; Xaa in position 16 is Leu
 or Val; Xaa in position 17 is Ile, Leu or Tyr; Xaa in position 18
 is Ser, Cys, Val or Arg; Xaa in position 20 is Thr, Ile or Val;
 Xaa in position 23 is Thr, Lys, Gln or Val

<400> 47

Lys Cys Val Thr Val Gly Asp Gly Ala Val Gly Lys Thr Cys Xaa Xaa

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1

5

10

15

Xaa Xaa Tyr Xaa Ser Asn Xaa Phe Pro Thr Asp Tyr Val Pro Thr Val
20 25 30

<210> 48

<211> 32

<212> PRT

<213> consensus

<220>

<221> MISC_FEATURE

<222> (1)..(32)

<223> Xaa any natural amino acid

<400> 48

Lys Xaa Val Xaa Xaa Gly Asp Xaa Xaa Xaa Gly Lys Xaa Xaa Xaa Xaa
1 5 10 15

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Phe Xaa Xaa Xaa Xaa Xaa Xaa Thr Val
20 25 30

<210> 49

<211> 16

<212> PRT

<213> consensus

<220>

<221> MISC_FEATURE

<222> (1)..(16)

<223>

<400> 49

Leu Trp Asp Thr Ala Gly Gln Glu Asp Tyr Asn Arg Leu Arg Pro Leu
1 5 10 15

<210> 50

<211> 16

<212> PRT

<213> consensus

<220>

<221> MISC_FEATURE

<222> (1)..(16)

<223> Xaa in position 1 is Leu or Ile; Xaa in position 9 is Asp, Lys or Glu; Xaa in position 10 is Tyr or Phe; Xaa in position 11 is Asn, Ser, Ala, His or Glu; Xaa in position 12 is Arg or Ala; Xaa in position 14 is Arg, Ala or Gly; Xaa in position 16 is Leu, Ile or Phe

<400> 50

Xaa	Trp	Asp	Thr	Ala	Gly	Gln	Glu	Xaa	Xaa	Xaa	Xaa	Leu	Xaa	Pro	Xaa
1				5				10						15	

<210> 51

<211> 7

<212> PRT

<213> consensus

<400> 51

Gly	Thr	Lys	Leu	Asp	Leu	Arg
1			5			

<210> 52

<211> 7

<212> PRT

<213> consensus

<220>

<221> MISC_FEATURE

<222> (1)..(7)

<223> Xaa in position 1 is Gly or Ala, Xaa in position 2 is Thr, Asn or Leu, Xaa in position 4 is Leu, Ala, Ser or Lys, Xaa in position 7 is Arg, His or Val

<400> 52

Xaa	Xaa	Lys	Xaa	Asp	Leu	Xaa
1				5		

<210> 53

<211> 24

<212> DNA

<213> primer

<400> 53

atgtctgaaa aggccgtag aagg

24

<210> 54

<211> 26

<212> DNA

<213> primer

<400> 54

ttataaaatt atgcaacagt tagccc

26

<210> 55

<211> 579

<212> DNA

<213> *Saccharomyces cerevisiae*

<220>

<221> CDS

<222> (1)..(579)

<400> 55

atg tct gaa aag gcc gtt aga agg aaa ctt gtt att att ggt gat ggt	48
Met Ser Glu Lys Ala Val Arg Arg Lys Leu Val Ile Ile Gly Asp Gly	
1 5 10 15	
gct tgt ggc aag acc tct tta cta tat gta ttt aca tta gga aaa ttc	96
Ala Cys Gly Lys Thr Ser Leu Leu Tyr Val Phe Thr Leu Gly Lys Phe	
20 25 30	
cct gaa caa tat cat ccg aca gtg ttc gag aat tat gtc act gat tgc	144
Pro Glu Gln Tyr His Pro Thr Val Phe Glu Asn Tyr Val Thr Asp Cys	
35 40 45	
aga gtt gac gga ata aaa gtg tcc tta acg ctc tgg gat aca gcg gga	192
Arg Val Asp Gly Ile Lys Val Ser Leu Thr Leu Trp Asp Thr Ala Gly	
50 55 60	
caa gag gaa tat gaa cgt tta cgt cca ttc tca tat tca aaa gca gat	240
Gln Glu Glu Tyr Glu Arg Leu Arg Pro Phe Ser Tyr Ser Lys Ala Asp	
65 70 75 80	
ata ata tta att ggg ttt gct gta gac aat ttt gaa tca cta att aac	288
Ile Ile Leu Ile Gly Phe Ala Val Asp Asn Phe Glu Ser Leu Ile Asn	
85 90 95	
gca agg acg aaa tgg gcg gat gag gca tta cga tat tgt cct gac gca	336
Ala Arg Thr Lys Trp Ala Asp Glu Ala Leu Arg Tyr Cys Pro Asp Ala	
100 105 110	
cca atc gtt ctt gta ggc ttg aaa aaa gat ttg agg caa gaa gcc cat	384
Pro Ile Val Leu Val Gly Leu Lys Lys Asp Leu Arg Gln Glu Ala His	
115 120 125	
ttt aaa gag aat gct acc gat gaa atg gtt ccc att gaa gat gca aaa	432
Phe Lys Glu Asn Ala Thr Asp Glu Met Val Pro Ile Glu Asp Ala Lys	
130 135 140	
caa gtt gca agg gcc att ggg gcc aag aaa tac atg gaa tgt agt gca	480

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Gln Val Ala Arg Ala Ile Gly Ala Lys Lys Tyr Met Glu Cys Ser Ala
 145 150 155 160
 ctg act ggt gag ggt gtg gat gat gtc ttt gaa gta gct aca aga acc 528
 Leu Thr Gly Glu Gly Val Asp Asp Val Phe Glu Val Ala Thr Arg Thr
 165 170 175
 agt ttg ctt atg aag aag gaa cca ggg gct aac tgt tgc ata att tta 576
 Ser Leu Leu Met Lys Lys Glu Pro Gly Ala Asn Cys Cys Ile Ile Leu
 180 185 190
 taa 579

<210> 56
 <211> 192
 <212> PRT
 <213> *Saccharomyces cerevisiae*

<400> 56
 Met Ser Glu Lys Ala Val Arg Arg Lys Leu Val Ile Ile Gly Asp Gly
 1 5 10 15
 Ala Cys Gly Lys Thr Ser Leu Leu Tyr Val Phe Thr Leu Gly Lys Phe
 20 25 30
 Pro Glu Gln Tyr His Pro Thr Val Phe Glu Asn Tyr Val Thr Asp Cys
 35 40 45
 Arg Val Asp Gly Ile Lys Val Ser Leu Thr Leu Trp Asp Thr Ala Gly
 50 55 60
 Gln Glu Glu Tyr Glu Arg Leu Arg Pro Phe Ser Tyr Ser Lys Ala Asp
 65 70 75 80
 Ile Ile Leu Ile Gly Phe Ala Val Asp Asn Phe Glu Ser Leu Ile Asn
 85 90 95
 Ala Arg Thr Lys Trp Ala Asp Glu Ala Leu Arg Tyr Cys Pro Asp Ala
 100 105 110
 Pro Ile Val Leu Val Gly Leu Lys Lys Asp Leu Arg Gln Glu Ala His
 115 120 125
 Phe Lys Glu Asn Ala Thr Asp Glu Met Val Pro Ile Glu Asp Ala Lys
 130 135 140
 Gln Val Ala Arg Ala Ile Gly Ala Lys Lys Tyr Met Glu Cys Ser Ala
 145 150 155 160
 Leu Thr Gly Glu Gly Val Asp Asp Val Phe Glu Val Ala Thr Arg Thr
 165 170 175
 Ser Leu Leu Met Lys Lys Glu Pro Gly Ala Asn Cys Cys Ile Ile Leu
 180 185 190

<210> 57
 <211> 803
 <212> DNA
 <213> *Nicotiana tabacum*

<220>
 <221> CDS
 <222> (49)..(642)

<400> 57
 aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaagaaaaa agaaaaaa atg agt gct 57
 Met Ser Ala
 1
 tca agg ttt atc aag tgt gtt acg gtt ggt gat ggt gct gtt ggg aaa 105
 Ser Arg Phe Ile Lys Cys Val Thr Val Gly Asp Gly Ala Val Gly Lys
 5 10 15
 act tgt ctt ttg att tca tac acc agc aat act ttc cct acg gat tat 153
 Thr Cys Leu Leu Ile Ser Tyr Thr Ser Asn Thr Phe Pro Thr Asp Tyr
 20 25 30 35
 gtg ccc act gtg ttt gac aat ttc agt gca aat gtt gtt gtc aat ggg 201
 Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val Val Val Asn Gly
 40 45 50
 agc act gtc aac cta ggg ttg tgg gat act gct gga cag gag gat tac 249
 Ser Thr Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln Glu Asp Tyr
 55 60 65

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aat agg tta aga cct ctg agt tac cgt gga gcc gat gtt ttc att ttg      297
Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp Val Phe Ile Leu
70      75      80
gca ttc tct ctc att agt aaa gcc agc tat gag aat gtt tcc aag aag      345
Ala Phe Ser Leu Ile Ser Lys Ala Ser Tyr Glu Asn Val Ser Lys Lys
85      90      95
tgg att cct gag ttg aag cac tat gct cct ggt gtc cca ata gtt ctt      393
Trp Ile Pro Glu Leu Lys His Tyr Ala Pro Gly Val Pro Ile Val Leu
100      105      110      115
gtt gga aca aag ctt gat ctt cgg gat gat aag caa ttc ttc ata gac      441
Val Gly Thr Lys Leu Asp Leu Arg Asp Asp Lys Gln Phe Phe Ile Asp
120      125      130
cat ccc ggt gct gtg cca att act act gct cag ggc gag gag cta agg      489
His Pro Gly Ala Val Pro Ile Thr Thr Ala Gln Gly Glu Glu Leu Arg
135      140      145
aaa act att ggt gca cct gct tac att gaa tgt agt tca aaa aca caa      537
Lys Thr Ile Gly Ala Pro Ala Tyr Ile Glu Cys Ser Ser Lys Thr Gln
150      155      160
cag aat gtg aaa gca gtc ttt gat gct gcc att aag gtc gtc ctc cag      585
Gln Asn Val Lys Ala Val Phe Asp Ala Ala Ile Lys Val Val Leu Gln
165      170      175
ccg cct aag acg aag aaa aag aag ggg aaa tct caa aaa tcc tgc tcg      633
Pro Pro Lys Thr Lys Lys Lys Lys Gly Lys Ser Gln Lys Ser Cys Ser
180      185      190      195
ata ttg tgatcaaact gtaggtccaa cgatagtgtc ggtcacaatt ctcgttgtaa      689
Ile Leu

tccctcactc actcgtatcc ctttatcttc cttcgtctca gaggaagtac gaggtcatcg      749

tttgtcttat atttgaaact actaaccatc tcttggaat atcaggtggc ttgg      803

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<210> 58

<211> 197

<212> PRT

<213> Nicotiana tabacum

<400> 58

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Met Ser Ala Ser Arg Phe Ile Lys Cys Val Thr Val Gly Asp Gly Ala
1      5      10      15
Val Gly Lys Thr Cys Leu Leu Ile Ser Tyr Thr Ser Asn Thr Phe Pro
20      25      30
Thr Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val Val
35      40      45
Val Asn Gly Ser Thr Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln
50      55      60
Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp Val
65      70      75      80
Phe Ile Leu Ala Phe Ser Leu Ile Ser Lys Ala Ser Tyr Glu Asn Val
85      90      95
Ser Lys Lys Trp Ile Pro Glu Leu Lys His Tyr Ala Pro Gly Val Pro
100      105      110
Ile Val Leu Val Gly Thr Lys Leu Asp Leu Arg Asp Asp Lys Gln Phe
115      120      125
Phe Ile Asp His Pro Gly Ala Val Pro Ile Thr Thr Ala Gln Gly Glu
130      135      140
Glu Leu Arg Lys Thr Ile Gly Ala Pro Ala Tyr Ile Glu Cys Ser Ser
145      150      155      160
Lys Thr Gln Gln Asn Val Lys Ala Val Phe Asp Ala Ala Ile Lys Val
165      170      175
Val Leu Gln Pro Pro Lys Thr Lys Lys Lys Lys Gly Lys Ser Gln Lys
180      185      190
Ser Cys Ser Ile Leu
195

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<210> 60
 <211> 198
 <212> PRT
 <213> Nicotiana tabacum

<400> 60
 Met Ser Ala Ser Arg Phe Ile Lys Cys Val Thr Val Gly Asp Gly Ala
 1 5 10 15
 Val Gly Lys Thr Cys Leu Leu Ile Ser Tyr Thr Ser Asn Thr Phe Pro
 20 25 30
 Thr Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val Val
 35 40 45
 Val Asp Gly Ser Thr Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln
 50 55 60
 Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp Val
 65 70 75 80
 Phe Ile Leu Ala Phe Ser Leu Ile Ser Lys Ala Ser Tyr Glu Asn Val
 85 90 95
 Ser Lys Lys Trp Ile Pro Glu Leu Arg His Tyr Ala Pro Gly Val Pro
 100 105 110
 Ile Ile Leu Val Gly Thr Lys Leu Asp Leu Arg Glu Asp Lys Gln Phe
 115 120 125
 Phe Leu Asp His Pro Gly Ala Val Pro Leu Thr Thr Ala Gln Gly Glu
 130 135 140
 Glu Leu Arg Lys Ser Ile Gly Ala Ser Ala Tyr Ile Glu Cys Ser Ala
 145 150 155 160
 Lys Thr Gln Gln Asn Val Lys Ala Val Phe Asp Ala Ala Ile Lys Val
 165 170 175
 Val Leu Gln Pro Pro Lys Gln Lys Lys Lys Lys Arg Lys Gly Gln
 180 185 190
 Lys Ala Cys Ser Ile Leu
 195

<210> 61
 <211> 640
 <212> DNA
 <213> Gossypium hirsutum

<220>
 <221> CDS
 <222> (17)..(613)

<400> 61
 cacgcgtggc gtaagt atg agt gct tcc agg ttc ata aaa tgc gtc acg gtc 52
 Met Ser Ala Ser Arg Phe Ile Lys Cys Val Thr Val
 1 5 10
 ggt gac ggt gcc gtc ggc aag act tgt ctg ctc att tcc tac act agc 100
 Gly Asp Gly Ala Val Gly Lys Thr Cys Leu Leu Ile Ser Tyr Thr Ser
 15 20 25
 aat act ttc cct acc gat tat gtg cca act gtc ttt gac aac ttt agt 148
 Asn Thr Phe Pro Thr Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser
 30 35 40
 gct aat gtg gtt gtg gat ggg aac act gtt aat ctg gga ttg tgg gat 196
 Ala Asn Val Val Val Asp Gly Asn Thr Val Asn Leu Gly Leu Trp Asp
 45 50 55 60
 act gct gga cag gaa gat tac aat aga tta aga cca ttg agc tat cgt 244
 Thr Ala Gly Gln Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg
 65 70 75
 gga gca gat gtc ttc ttg ctg gca ttt tct ctc att agc aaa gct agc 292
 Gly Ala Asp Val Phe Leu Leu Ala Phe Ser Leu Ile Ser Lys Ala Ser
 80 85 90
 tat gaa aat gtt gct aag aaa tgg att cca gaa ttg aga cat tat gca 340
 Tyr Glu Asn Val Ala Lys Lys Trp Ile Pro Glu Leu Arg His Tyr Ala
 95 100 105

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ccc ggt gtt cca att att ctt gtt ggg act aag ctt gat ctt cga gaa      388
Pro Gly Val Pro Ile Ile Leu Val Gly Thr Lys Leu Asp Leu Arg Glu
    110                      115                      120
gat aag cag ttc ttc ata gat cac cct ggt gcg gtg ccc att acc aca      436
Asp Lys Gln Phe Phe Ile Asp His Pro Gly Ala Val Pro Ile Thr Thr
    125                      130                      135                      140
gca cag ggt gag gaa ttg aga aag cta att gga gcg cat ttt tac att      484
Ala Gln Gly Glu Glu Leu Arg Lys Leu Ile Gly Ala His Phe Tyr Ile
    145                      150                      155
gag tgt agt tca aaa aca caa cag aat gtg aaa gcg gtc ttt gat gcg      532
Glu Cys Ser Ser Lys Thr Gln Gln Asn Val Lys Ala Val Phe Asp Ala
    160                      165                      170
gcc atc aaa gta gtt ctc cag cct cca aag aag aag aag aaa aag aag      580
Ala Ile Lys Val Val Leu Gln Pro Pro Lys Lys Lys Lys Lys Lys Lys
    175                      180                      185
aga aag gca caa aaa gct tgc tca ata ttg tgatcatgca aagaagtgat      630
Arg Lys Ala Gln Lys Ala Cys Ser Ile Leu
    190                      195
attggtgcag      640

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<210> 62
 <211> 198
 <212> PRT
 <213> *Gossypium hirsutum*

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<400> 62
Met Ser Ala Ser Arg Phe Ile Lys Cys Val Thr Val Gly Asp Gly Ala
1      5      10      15
Val Gly Lys Thr Cys Leu Leu Ile Ser Tyr Thr Ser Asn Thr Phe Pro
    20      25      30
Thr Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val Val
    35      40      45
Val Asp Gly Asn Thr Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln
    50      55      60
Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp Val
    65      70      75      80
Phe Leu Leu Ala Phe Ser Leu Ile Ser Lys Ala Ser Tyr Glu Asn Val
    85      90      95
Ala Lys Lys Trp Ile Pro Glu Leu Arg His Tyr Ala Pro Gly Val Pro
    100     105     110
Ile Ile Leu Val Gly Thr Lys Leu Asp Leu Arg Glu Asp Lys Gln Phe
    115     120     125
Phe Ile Asp His Pro Gly Ala Val Pro Ile Thr Thr Ala Gln Gly Glu
    130     135     140
Glu Leu Arg Lys Leu Ile Gly Ala His Phe Tyr Ile Glu Cys Ser Ser
    145     150     155     160
Lys Thr Gln Gln Asn Val Lys Ala Val Phe Asp Ala Ala Ile Lys Val
    165     170     175
Val Leu Gln Pro Pro Lys Lys Lys Lys Lys Lys Lys Arg Lys Ala Gln
    180     185     190
Lys Ala Cys Ser Ile Leu
    195

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<210> 63
 <211> 1025
 <212> DNA
 <213> *Nicotiana tabacum*

<220>
 <221> CDS
 <222> (103)..(696)

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<400> 63
ttcttgatc cgccagctc ccccatacc atttcaatct ttttttttgt ttataatttt      60

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tttctgggaa tcaggtcttc tcaagaagat ctgagaagaa aa atg agt gct tcg	114
Met Ser Ala Ser	
1	
agg ttt ata aaa tgt gtg acg gtg ggt gat ggt gcc gtt gga aaa acg	162
Arg Phe Ile Lys Cys Val Thr Val Gly Asp Gly Ala Val Gly Lys Thr	
5 10 15 20	
tgt ctc ttg att tct tac acc agc aac acc ttt cct acg gat tat gtg	210
Cys Leu Leu Ile Ser Tyr Thr Ser Asn Thr Phe Pro Thr Asp Tyr Val	
25 30 35	
cct act gtg ttc gat aat ttc agt gca aat gtg gtc gtc aat ggg agt	258
Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val Val Val Asn Gly Ser	
40 45 50	
act gtc aac cta ggg ttg tgg gat aca gct gga cag gag gat tac aat	306
Thr Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln Glu Asp Tyr Asn	
55 60 65	
agg tta aga cct ctg agt tac cgt gga gct gat gtt ttc atc ttg gca	354
Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp Val Phe Ile Leu Ala	
70 75 80	
ttc tct ctc att agt aaa gcc agc tat gaa aat gtt tcc aag aag tgg	402
Phe Ser Leu Ile Ser Lys Ala Ser Tyr Glu Asn Val Ser Lys Lys Trp	
85 90 95 100	
att cct gag ttg aag cat tat gct ccc ggt gtt cca ata gtg ctt gtt	450
Ile Pro Glu Leu Lys His Tyr Ala Pro Gly Val Pro Ile Val Leu Val	
105 110 115	
gga aca aaa ctt gat ctt cgg gat gat aag cag ttc ttc ata gac cat	498
Gly Thr Lys Leu Asp Leu Arg Asp Asp Lys Gln Phe Phe Ile Asp His	
120 125 130	
cct ggt gct gtg cca att act act gct cag gcc gag gag ctg agg aaa	546
Pro Gly Ala Val Pro Ile Thr Thr Ala Gln Gly Glu Glu Leu Arg Lys	
135 140 145	
acg att ggg gcc cct gct tac att gaa tgt agt tca aaa aca caa cag	594
Thr Ile Gly Ala Pro Ala Tyr Ile Glu Cys Ser Ser Lys Thr Gln Gln	
150 155 160	
aat gtg aaa gca gtc ttt gat gct gct att aag gtc gtg ctc cag cca	642
Asn Val Lys Ala Val Phe Asp Ala Ala Ile Lys Val Val Leu Gln Pro	
165 170 175 180	
ccc aag cag aaa aaa aag aag ggg aag gcc caa aag gca tgt tcg att	690
Pro Lys Gln Lys Lys Lys Lys Gly Lys Ala Gln Lys Ala Cys Ser Ile	
185 190 195	
ttg tgatcaacag taggtccaac aatattactg gtcacagtgc tccttgtaat	743
Leu	
ctctccctca tattcctttg tttttccttt gtctcggaga aagtaggagg tccatgtatg	803
tctcttttaaa attacttggtg atctcttgaa ttgcaggtgg ctcggttttt atactgctgt	863
catctctagt tggtgagtca cagcaccttg ttgtaggcca ctgattgggc cctctctggt	923
ttcatttgct ttatgattaa tgactgaaag atccagttgg aaaaaaaaaa aaaaaaaaaa	983
aaaaaaaaactcg gggggggccg ggcccaatcc cctatagggg tg	1025

<210> 64

<211> 197

<212> PRT

<213> Nicotiana tabacum

<400> 64

Met Ser Ala Ser Arg Phe Ile Lys Cys Val Thr Val Gly Asp Gly Ala

1

5

10

15

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Val Gly Lys Thr Cys Leu Leu Ile Ser Tyr Thr Ser Asn Thr Phe Pro
 20 25 30
 Thr Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val Val
 35 40 45
 Val Asn Gly Ser Thr Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln
 50 55 60
 Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp Val
 65 70 75 80
 Phe Ile Leu Ala Phe Ser Leu Ile Ser Lys Ala Ser Tyr Glu Asn Val
 85 90 95
 Ser Lys Lys Trp Ile Pro Glu Leu Lys His Tyr Ala Pro Gly Val Pro
 100 105 110
 Ile Val Leu Val Gly Thr Lys Leu Asp Leu Arg Asp Asp Lys Gln Phe
 115 120 125
 Phe Ile Asp His Pro Gly Ala Val Pro Ile Thr Thr Ala Gln Gly Glu
 130 135 140
 Glu Leu Arg Lys Thr Ile Gly Ala Pro Ala Tyr Ile Glu Cys Ser Ser
 145 150 155 160
 Lys Thr Gln Gln Asn Val Lys Ala Val Phe Asp Ala Ala Ile Lys Val
 165 170 175
 Val Leu Gln Pro Pro Lys Gln Lys Lys Lys Gly Lys Ala Gln Lys
 180 185 190
 Ala Cys Ser Ile Leu
 195

<210> 65

<211> 1178

<212> DNA

<213> Medicago truncatula

<220>

<221> CDS

<222> (136)..(729)

<400> 65

cctattttcat cttcatcacc gattattctt gaacagttac caatttcaaa ctcaaacaca 60

caacaacatt gacacatgaa taattagggt ttatacctca aagaaacaca acaaacttga 120

ataattaggt tcgaa atg agt ggt tcc agg ttc atc aag tgt gtc aca gtt 171
 Met Ser Gly Ser Arg Phe Ile Lys Cys Val Thr Val
 1 5 10

ggt gat ggt gcc gtt gga aag act tgt ttg ctt atc tcc tac acc agc 219
 Gly Asp Gly Ala Val Gly Lys Thr Cys Leu Leu Ile Ser Tyr Thr Ser
 15 20 25

aac act ttc cct acg gac tat gtg ccg act gtc ttt gac aat ttc agt 267
 Asn Thr Phe Pro Thr Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser
 30 35 40

gca aat gta gtt gtg gat ggg agc act ata aat ctc ggg ttg tgg gat 315
 Ala Asn Val Val Val Asp Gly Ser Thr Ile Asn Leu Gly Leu Trp Asp
 45 50 55 60

act gct ggc caa gaa gat tac aat aga tta aga ccc tta agc tat cgt 363
 Thr Ala Gly Gln Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg
 65 70 75

gga gca gat gtt ttc ctg ctt gct ttt tct ctc ata agc aag gct agc 411
 Gly Ala Asp Val Phe Leu Leu Ala Phe Ser Leu Ile Ser Lys Ala Ser
 80 85 90

tat gaa aat att gcc aaa aaa tgg att cct gag ttg agg cat tat gct 459
 Tyr Glu Asn Ile Ala Lys Lys Trp Ile Pro Glu Leu Arg His Tyr Ala
 95 100 105

cct ggt gtt cca att att ctc gtt gga aca aaa ctt gat ctt cgg gat 507
 Pro Gly Val Pro Ile Ile Leu Val Gly Thr Lys Leu Asp Leu Arg Asp
 110 115 120

gat agc cag ttc ttt caa gac cat cct ggt gcg gcg cca atc acc aca 555
 Asp Ser Gln Phe Phe Gln Asp His Pro Gly Ala Ala Pro Ile Thr Thr
 125 130 135 140

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gca cag ggt gag gaa ctg aga aaa ctt atc ggt gct cca gtt tac att 603
 Ala Gln Gly Glu Leu Arg Lys Leu Ile Gly Ala Pro Val Tyr Ile
 145 150 155
 gaa tgt agt tcc aaa aca cag aag aat gtg aag gct gtt ttt gat tcg 651
 Glu Cys Ser Ser Lys Thr Gln Lys Asn Val Lys Ala Val Phe Asp Ser
 160 165 170
 gcc atc aaa gta gtt cta cag cca cca aag caa aag aaa aca aag aga 699
 Ala Ile Lys Val Val Leu Gln Pro Lys Gln Lys Lys Thr Lys Arg
 175 180 185
 aag ggg caa aaa gcc tgt tcc att ttg tgatcttcag ttctttcgta 746
 Lys Gly Gln Lys Ala Cys Ser Ile Leu
 190 195
 ttgtagtgtg tggaggatga catgacagta gccattttcc tgggtaatcc tttgccattc 806

 tgattctata tatatcctta tactattttc gacctagatg gaggaaccgc catgtccaac 866

 tgaccgcgtt aaagcttgct tataaaaaat caagctatct gtctctggct gaaggataat 926

 atgtgaagtc ataattccat catgtttggt gtgtacaatt gttgtgtttc tccggaatgt 986

 ttaccttttg tattgattat caaatgggtca tctccatttg tggacatggg ttttactcac 1046

 attgtagtct aatcttagga agtgcttgca acatatgtgc tttggatgtg aactaagtat 1106

 atgtaattaa ttatgttagc tacttaacat ccttaatata gctcggtttg ttcaaaaaaa 1166

 aaaaaaaaaa aa 1178

<210> 66

<211> 197

<212> PRT

<213> Medicago truncatula

<400> 66

Met Ser Gly Ser Arg Phe Ile Lys Cys Val Thr Val Gly Asp Gly Ala
 1 5 10 15
 Val Gly Lys Thr Cys Leu Leu Ile Ser Tyr Thr Ser Asn Thr Phe Pro
 20 25 30
 Thr Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val Val
 35 40 45
 Val Asp Gly Ser Thr Ile Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln
 50 55 60
 Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp Val
 65 70 75 80
 Phe Leu Leu Ala Phe Ser Leu Ile Ser Lys Ala Ser Tyr Glu Asn Ile
 85 90 95
 Ala Lys Lys Trp Ile Pro Glu Leu Arg His Tyr Ala Pro Gly Val Pro
 100 105 110
 Ile Ile Leu Val Gly Thr Lys Leu Asp Leu Arg Asp Asp Ser Gln Phe
 115 120 125
 Phe Gln Asp His Pro Gly Ala Ala Pro Ile Thr Thr Ala Gln Gly Glu
 130 135 140
 Glu Leu Arg Lys Leu Ile Gly Ala Pro Val Tyr Ile Glu Cys Ser Ser
 145 150 155 160
 Lys Thr Gln Lys Asn Val Lys Ala Val Phe Asp Ser Ala Ile Lys Val
 165 170 175
 Val Leu Gln Pro Pro Lys Gln Lys Lys Thr Lys Arg Lys Gly Gln Lys
 180 185 190

Ala Cys Ser Ile Leu
195

<210> 67
<211> 1139
<212> DNA
<213> Medicago truncatula

<220>
<221> CDS
<222> (174)..(767)

<400> 67
acgaacgaac gcttcaacgg caaaatttcc cgggttcctt gtctctcttt catgcgcgag 60

aattctcatt ttctcacgct cctaattggat gcgtaattga agcgaataat tggaggagtg 120

tgtgagtgat ttggagtaat aagggtgaaag atctggatag ggtttgaaag aag atg 176
Met
1
agc gct tct agg ttc atc aag tgt gtt act gtt ggg gat gga gct gtt 224
Ser Ala Ser Arg Phe Ile Lys Cys Val Thr Val Gly Asp Gly Ala Val
5 10 15
ggg aaa act tgt ttg tta att tca tac acc agc aat acc ttc ccc act 272
Gly Lys Thr Cys Leu Leu Ile Ser Tyr Thr Ser Asn Thr Phe Pro Thr
20 25 30
gac tat gtg cca act gtc ttc gac aat ttc agt gca aat gtg gtt gtg 320
Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val Val Val
35 40 45
aat gga agc act gtg aat ctg ggt ttg tgg gac act gca gga caa gag 368
Asn Gly Ser Thr Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln Glu
50 55 60 65
gat tat aac aga tta aga cct ttg agt tat cgt ggt gcc gat gtt ttc 416
Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp Val Phe
70 75 80
att ctc gct ttc tcc ctc ata agc aag gcc agt tat gaa aat gtt tcc 464
Ile Leu Ala Phe Ser Leu Ile Ser Lys Ala Ser Tyr Glu Asn Val Ser
85 90 95
aaa aag tgg att cca gag ttg aag cat tat gca cct ggt gtt ccc att 512
Lys Lys Trp Ile Pro Glu Leu Lys His Tyr Ala Pro Gly Val Pro Ile
100 105 110
att ctg gtt ggc aca aag ctt gac ctt cgg gat gac aag cag ttc ttc 560
Ile Leu Val Gly Thr Lys Leu Asp Leu Arg Asp Asp Lys Gln Phe Phe
115 120 125
gtc gac cat cct ggt gct gtt cct att acc act gct cag gga gaa gag 608
Val Asp His Pro Gly Ala Val Pro Ile Thr Thr Ala Gln Gly Glu Glu
130 135 140 145
ctt agg aag ctg atc aat gca cct gct tat atc gaa tgc agt tgc aaa 656
Leu Arg Lys Leu Ile Asn Ala Pro Ala Tyr Ile Glu Cys Ser Ser Lys
150 155 160
tca cag cag aat gtg aaa gca gtc ttt gat gca gcc ata aga gtt gtc 704
Ser Gln Gln Asn Val Lys Ala Val Phe Asp Ala Ala Ile Arg Val Val
165 170 175
ctt caa cca aag caa aag aaa aag aag agt aaa gca cca aag gct 752
Leu Gln Pro Pro Lys Gln Lys Lys Lys Lys Ser Lys Ala Pro Lys Ala
180 185 190
tgt tgc ata ttg tgatttgcta ggtcggctta aagaaatttg acaaccattc 804
Cys Ser Ile Leu
195
tccaacatgt atttctctcc tcttcttccct attcttcatt cctattatgc tgaagaagtt 864

ggagtctatg tgggtgttct ttcgtctaac agactctaga tctcgttgaa gcataagggtg 924

gttggtgctt tgctttcttg gaattattgt gacttctaatt tgtcaaattt gtatttcattg 984

Ala Cys Ser Ile Leu
195

<210> 67
<211> 1139
<212> DNA
<213> *Medicago truncatula*

<220>
<221> CDS
<222> (174) .. (767)

<400> 67
acgaacgaac gcttcaacgg caaaatttcc cgggttcctt gtctctcttt catgcgcgag 60

aattctcatt ttctcacgct cctaattggat gcgtaattga agcgaataat tggaggagtg 120

tgtgagtgat ttggagtaat aagggtgaaag atctggatag ggtttgaaag aag atg 176
Met
1

agc gct tct agg ttc atc aag tgt gtt act gtt ggg gat gga gct gtt 224
Ser Ala Ser Arg Phe Ile Lys Cys Val Thr Val Gly Asp Gly Ala Val
5 10 15

ggg aaa act tgt ttg tta att tca tac acc agc aat acc ttc ccc act 272
Gly Lys Thr Cys Leu Leu Ile Ser Tyr Thr Ser Asn Thr Phe Pro Thr
20 25 30

gac tat gtg cca act gtc ttc gac aat ttc agt gca aat gtg gtt gtg 320
Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val Val Val
35 40 45

aat gga agc act gtg aat ctg ggt ttg tgg gac act gca gga caa gag 368
Asn Gly Ser Thr Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln Glu
50 55 60 65

gat tat aac aga tta aga cct ttg agt tat cgt ggt gcc gat gtt ttc 416
Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp Val Phe
70 75 80

att ctg gct ttc tcc ctg ata agc aag gcc agt tat gaa aat gtt tcc 464
Ile Leu Ala Phe Ser Leu Ile Ser Lys Ala Ser Tyr Glu Asn Val Ser
85 90 95

aaa aag tgg att cca gag ttg aag cat tat gca cct ggt gtt ccc att 512
Lys Lys Trp Ile Pro Glu Leu Lys His Tyr Ala Pro Gly Val Pro Ile
100 105 110

att ctg gtt ggc aca aag ctt gac ctt cgg gat gac aag cag ttc ttc 560
Ile Leu Val Gly Thr Lys Leu Asp Leu Arg Asp Asp Lys Gln Phe Phe
115 120 125

gtc gac cat cct ggt gct gtt cct att acc act gct cag gga gaa gag 608
Val Asp His Pro Gly Ala Val Pro Ile Thr Thr Ala Gln Gly Glu Glu
130 135 140 145

ctt agg aag ctg atc aat gca cct gct tat atc gaa tgc agt tgc aaa 656
Leu Arg Lys Leu Ile Asn Ala Pro Ala Tyr Ile Glu Cys Ser Ser Lys
150 155 160

tca cag cag aat gtg aaa gca gtc ttt gat gca gcc ata aga gtt gtc 704
Ser Gln Gln Asn Val Lys Ala Val Phe Asp Ala Ala Ile Arg Val Val
165 170 175

ctt caa cca cca aag caa aag aaa aag aag agt aaa gca cca aag gct 752
Leu Gln Pro Pro Lys Gln Lys Lys Lys Ser Lys Ala Pro Lys Ala
180 185 190

tgt tgc ata ttg tgatttgcta ggtcgggtcta aagaaatttg acaaccattc 804
Cys Ser Ile Leu
195

tccaacatgt atttctctcc tcttcttctt attcttcatt cctattatgc tgaagaagtt 864

ggagtctatg tgggtgttct ttcgtctaac agactctaga tctcgttgaa gcataagggtg 924

gttgggtgctt tgctttcttg gaattattgt gacttctaatt tgtcaaattt gtatttcattg 984

gttccacact ttttcttaac ataagtttta tgtattaata gactggaata tcccagttag 1044

gattactacc ttgtttgctt gaagatatata ataatatcta cattattttg catttagtta 1104

taatgcttgc tctattcaaa aaaaaaaaaa aaaaa 1139

<210> 68
 <211> 197
 <212> PRT
 <213> Medicago truncatula

<400> 68
 Met Ser Ala Ser Arg Phe Ile Lys Cys Val Thr Val Gly Asp Gly Ala
 1 5 10 15
 Val Gly Lys Thr Cys Leu Leu Ile Ser Tyr Thr Ser Asn Thr Phe Pro
 20 25 30
 Thr Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val Val
 35 40 45
 Val Asn Gly Ser Thr Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln
 50 55 60
 Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp Val
 65 70 75 80
 Phe Ile Leu Ala Phe Ser Leu Ile Ser Lys Ala Ser Tyr Glu Asn Val
 85 90 95
 Ser Lys Lys Trp Ile Pro Glu Leu Lys His Tyr Ala Pro Gly Val Pro
 100 105 110
 Ile Ile Leu Val Gly Thr Lys Leu Asp Leu Arg Asp Asp Lys Gln Phe
 115 120 125
 Phe Val Asp His Pro Gly Ala Val Pro Ile Thr Thr Ala Gln Gly Glu
 130 135 140
 Glu Leu Arg Lys Leu Ile Asn Ala Pro Ala Tyr Ile Glu Cys Ser Ser
 145 150 155 160
 Lys Ser Gln Gln Asn Val Lys Ala Val Phe Asp Ala Ala Ile Arg Val
 165 170 175
 Val Leu Gln Pro Pro Lys Gln Lys Lys Lys Ser Lys Ala Pro Lys
 180 185 190
 Ala Cys Ser Ile Leu
 195

<210> 69
 <211> 985
 <212> DNA
 <213> Medicago truncatula

<220>
 <221> CDS
 <222> (143)..(736)

<400> 69
 gttcaacgct aaaatcacac tctcatcttc caaatagatg tgtgatagta attgaaagag 60

aagaagaaga agaaagtact ggaggagggg gactgtcctc aggtgaagat ctgaggctat 120

tttgggtatt tcatttttca ag atg agt gct tct agg ttt att aaa tgt gtt 172
 Met Ser Ala Ser Arg Phe Ile Lys Cys Val
 1 5 10

act gtt ggt gat gga gct gtt ggc aaa act tgt ttg ttg att tct tac 220
 Thr Val Gly Asp Gly Ala Val Gly Lys Thr Cys Leu Leu Ile Ser Tyr
 15 20 25

63/291

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acc agc aat act ttc ccc acg gat tat gtg ccg aca gtt ttt gac aat      268
Thr Ser Asn Thr Phe Pro Thr Asp Tyr Val Pro Thr Val Phe Asp Asn
          30                      35                      40
ttc agt gcg aat gtg gtt gtt aat gga agt att gtg aat ctg ggt ttg      316
Phe Ser Ala Asn Val Val Val Asn Gly Ser Ile Val Asn Leu Gly Leu
          45                      50                      55
tgg gat act gct gga caa gag gat tat aac aga tta aga cct ttg agt      364
Trp Asp Thr Ala Gly Gln Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser
          60                      65                      70
tac cgt ggt gcc gat gtt ttc ata ttg gct ttc tct ctc ata agc aaa      412
Tyr Arg Gly Ala Asp Val Phe Ile Leu Ala Phe Ser Leu Ile Ser Lys
          75                      80                      85                      90
gcc agt tat gaa aat gtc tcc aaa aag tgg att cca gag ttg aag cat      460
Ala Ser Tyr Glu Asn Val Ser Lys Lys Trp Ile Pro Glu Leu Lys His
          95                      100                      105
tat gca cct ggt gtc ccc ata att ctg gtt gga aca aag ctt gat ctt      508
Tyr Ala Pro Gly Val Pro Ile Ile Leu Val Gly Thr Lys Leu Asp Leu
          110                      115                      120
cgg gat gat aag cag ttc tgc ata gac cat cct ggt gcc gtt ccc att      556
Arg Asp Asp Lys Gln Phe Cys Ile Asp His Pro Gly Ala Val Pro Ile
          125                      130                      135
acc aca gct cag gga gaa gag ctg agg aag ctg att aat gca cca gct      604
Thr Thr Ala Gln Gly Glu Leu Arg Lys Leu Ile Asn Ala Pro Ala
          140                      145                      150
tac att gaa tgc agt tca aaa tca cag gag aac gtg aag gcg gtg ttt      652
Tyr Ile Glu Cys Ser Ser Lys Ser Gln Glu Asn Val Lys Ala Val Phe
          155                      160                      165                      170
gat gca gcc ata aga gtt gtc ctt caa cca cca aag cag aag aaa aag      700
Asp Ala Ala Ile Arg Val Val Leu Gln Pro Pro Lys Gln Lys Lys Lys
          175                      180                      185
aag aat aaa gca caa aag gcc tgt tca ata ttg taattcacta ggtgtaaaca      753
Lys Asn Lys Ala Gln Lys Ala Cys Ser Ile Leu
          190                      195
tttgattgtc ctttgttcta cctgtattcc cctcccccttc ttttcatcat tttctttgtt      813

attgaagaag ttggagagtc tttgtgggtg ttctttcaga caaatactct agatctcctt      873

gaagcataag gtggettaat gtttttgcct tctatgaatt attattgtca actctaatag      933

ttaaatttgc atttcatgct tcccatcttt ttaaaaaaaaa aaaaaaaaaa aa      985

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<210> 70

<211> 197

<212> PRT

<213> Medicago truncatula

<400> 70

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Met Ser Ala Ser Arg Phe Ile Lys Cys Val Thr Val Gly Asp Gly Ala
1          5          10          15
Val Gly Lys Thr Cys Leu Leu Ile Ser Tyr Thr Ser Asn Thr Phe Pro
          20          25          30
Thr Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val Val
          35          40          45
Val Asn Gly Ser Ile Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln
          50          55          60
Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp Val
65          70          75          80
Phe Ile Leu Ala Phe Ser Leu Ile Ser Lys Ala Ser Tyr Glu Asn Val
          85          90          95
Ser Lys Lys Trp Ile Pro Glu Leu Lys His Tyr Ala Pro Gly Val Pro
          100          105          110
Ile Ile Leu Val Gly Thr Lys Leu Asp Leu Arg Asp Asp Lys Gln Phe

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64/291

115 120 125
 Cys Ile Asp His Pro Gly Ala Val Pro Ile Thr Thr Ala Gln Gly Glu
 130 135 140
 Glu Leu Arg Lys Leu Ile Asn Ala Pro Ala Tyr Ile Glu Cys Ser Ser
 145 150 155
 Lys Ser Gln Glu Asn Val Lys Ala Val Phe Asp Ala Ala Ile Arg Val
 165 170 175
 Val Leu Gln Pro Pro Lys Gln Lys Lys Lys Lys Asn Lys Ala Gln Lys
 180 185 190
 Ala Cys Ser Ile Leu
 195

<210> 71
 <211> 779
 <212> DNA
 <213> Brassica napus

<220>
 <221> CDS
 <222> (183)..(776)

<400> 71
 ggctcatagg gtttctagtt ttcgggagaa agttctttca tttttcaaga atgccagat 60

 gctcgattga gggtgagcat ccagacaacg aagaagaaaa ttaacaaaat ctttgagctt 120

 ttctttttat ttttggtttt tccccctga aagtattaac aaataatctt cgagtagaga 180

 aa atg agc gca tct cgg ttc ata aag tgt gta acg gtt ggt gat gga 227
 Met Ser Ala Ser Arg Phe Ile Lys Cys Val Thr Val Gly Asp Gly
 1 5 10 15
 gct gtc gga aaa aca tgt ttg ttg att tct tac aca agc aac act ttc 275
 Ala Val Gly Lys Thr Cys Leu Leu Ile Ser Tyr Thr Ser Asn Thr Phe
 20 25 30
 cct acg gac tat gtg ccc acc gtt ttc gat aat ttc agt gct aat gtg 323
 Pro Thr Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val
 35 40 45
 gtg gtt aac gga gcc acc gtt aat ctt gga ttg tgg gat act gca ggg 371
 Val Val Asn Gly Ala Thr Val Asn Leu Gly Leu Trp Asp Thr Ala Gly
 50 55 60
 caa gag gat tac aac aga tta aga cca cta agc tac cgt gga gct gat 419
 Gln Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp
 65 70 75
 gtt ttc ata ttg gcc ttc tct ctt atc agt aaa gcc agt tat gaa aac 467
 Val Phe Ile Leu Ala Phe Ser Leu Ile Ser Lys Ala Ser Tyr Glu Asn
 80 85 90 95
 gtc tcc aaa aag tgg atc ccg gag ttg aag cat tac gcg cct ggt gtc 515
 Val Ser Lys Lys Trp Ile Pro Glu Leu Lys His Tyr Ala Pro Gly Val
 100 105 110
 ccc gtc atc ctt gtt gga tca aag ctt gat ctt cga gat gat aag caa 563
 Pro Val Ile Leu Val Gly Ser Lys Leu Asp Leu Arg Asp Asp Lys Gln
 115 120 125
 ttc ttc gtc gac cat cct ggc gct gtc ccg att aca act gct cag gga 611
 Phe Phe Val Asp His Pro Gly Ala Val Pro Ile Thr Thr Ala Gln Gly
 130 135 140
 gag gag ctg agg aag cta ata gat gca cct act tac atc gaa tgc agt 659
 Glu Glu Leu Arg Lys Leu Ile Asp Ala Pro Thr Tyr Ile Glu Cys Ser
 145 150 155
 tcc aaa tct caa gag aat gtg aaa gct gtc ttt gac gca gcc ata cga 707
 Ser Lys Ser Gln Glu Asn Val Lys Ala Val Phe Asp Ala Ala Ile Arg
 160 165 170 175
 gtg gtg ttg caa ccg cct aag cag aag aag aaa aag agc aaa gcg cag 755
 Val Val Leu Gln Pro Pro Lys Gln Lys Lys Lys Lys Ser Lys Ala Gln
 180 185 190
 aag gca tgc tcc atc cag tgatat 779

Lys Ala Cys Ser Ile Gln
195

<210> 72
<211> 197
<212> PRT
<213> Brassica napus

<400> 72
Met Ser Ala Ser Arg Phe Ile Lys Cys Val Thr Val Gly Asp Gly Ala
1 5 10 15
Val Gly Lys Thr Cys Leu Leu Ile Ser Tyr Thr Ser Asn Thr Phe Pro
20 25 30
Thr Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val Val
35 40 45
Val Asn Gly Ala Thr Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln
50 55 60
Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp Val
65 70 75 80
Phe Ile Leu Ala Phe Ser Leu Ile Ser Lys Ala Ser Tyr Glu Asn Val
85 90 95
Ser Lys Lys Trp Ile Pro Glu Leu Lys His Tyr Ala Pro Gly Val Pro
100 105 110
Val Ile Leu Val Gly Ser Lys Leu Asp Leu Arg Asp Asp Lys Gln Phe
115 120 125
Phe Val Asp His Pro Gly Ala Val Pro Ile Thr Thr Ala Gln Gly Glu
130 135 140
Glu Leu Arg Lys Leu Ile Asp Ala Pro Thr Tyr Ile Glu Cys Ser Ser
145 150 155 160
Lys Ser Gln Glu Asn Val Lys Ala Val Phe Asp Ala Ala Ile Arg Val
165 170 175
Val Leu Gln Pro Pro Lys Gln Lys Lys Lys Ser Lys Ala Gln Lys
180 185 190
Ala Cys Ser Ile Gln
195

<210> 73
<211> 757
<212> DNA
<213> Brassica napus

<220>
<221> CDS
<222> (164)..(757)

<400> 73
cgatacaccg attcatttca ttcttcattg atcgcttccct ctcacatacc cgatttcggt 60

taggggttaac attttctagg gtttttagaga taggcgaaac tgaaattgag aagaagacgg 120

gtgttggttc ctcatagatc tgagggggtg aatttttoga ttt atg agc gca tct 175
Met Ser Ala Ser
1
cgg ttc ata aag tgc gtg acg gtt ggg gac gga gca gtg ggc aaa aca 223
Arg Phe Ile Lys Cys Val Thr Val Gly Asp Gly Ala Val Gly Lys Thr
5 10 15 20
tgt ctc ctc atc tct tac acc agc aac act ttc cct acg gat tat gtt 271
Cys Leu Leu Ile Ser Tyr Thr Ser Asn Thr Phe Pro Thr Asp Tyr Val
25 30 35
cca act gtt ttc gat aac ttc agc gct aat gtt gtt gtt aac gga gcc 319
Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val Val Val Asn Gly Ala
40 45 50
act gtc aac tta gga ctc tgg gat acc gca ggg cag gag gat tat aac 367
r Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln Glu Asp Tyr Asn
55 60 65

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aga ttg aga ccc ttg agt tac cgc ggt gct gac gtt ttc atc ttg gcc      415
Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp Val Phe Ile Leu Ala
   70                               75                               80
ttc tct ctc atc agt aag gct agt tat gag aat gtc tcc aag aag tgg      463
Phe Ser Leu Ile Ser Lys Ala Ser Tyr Glu Asn Val Ser Lys Lys Trp
   85                               90                               95                               100
atc cct gag ctg acc cac tat gcc cct ggt gtc cct atc gtt ctt gtt      511
Ile Pro Glu Leu Thr His Tyr Ala Pro Gly Val Pro Ile Val Leu Val
                               105                               110                               115
ggt acc aaa cta gat ctt agg gat gac aaa cag ttc ttc gtt gac cac      559
Gly Thr Lys Leu Asp Leu Arg Asp Asp Lys Gln Phe Phe Val Asp His
                               120                               125                               130
cct ggt gct gta cct att acc act tct cag gga gag gaa cta atg aag      607
Pro Gly Ala Val Pro Ile Thr Thr Ser Gln Gly Glu Glu Leu Met Lys
                               135                               140                               145
cta att gga gct cct tcg tac atc gag tgc agt tca aaa tct caa gag      655
Leu Ile Gly Ala Pro Ser Tyr Ile Glu Cys Ser Ser Lys Ser Gln Glu
   150                               155                               160
aac gtg aaa ggg gtg ttt gat gca gcg atc aga gtg gta ctt caa cct      703
Asn Val Lys Gly Val Phe Asp Ala Ala Ile Arg Val Val Leu Gln Pro
   165                               170                               175                               180
cca aag cag aag aaa aag aag agc aag gca caa aag gcc tgc tcc att      751
Pro Lys Gln Lys Lys Lys Lys Ser Lys Ala Gln Lys Ala Cys Ser Ile
                               185                               190                               195

ttg taa
Leu

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<210> 74

<211> 197

<212> PRT

<213> Brassica napus

<400> 74

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Met Ser Ala Ser Arg Phe Ile Lys Cys Val Thr Val Gly Asp Gly Ala
1                               5                               10                               15
Val Gly Lys Thr Cys Leu Leu Ile Ser Tyr Thr Ser Asn Thr Phe Pro
   20                               25                               30
Thr Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val Val
   35                               40                               45
Val Asn Gly Ala Thr Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln
   50                               55                               60
Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp Val
   65                               70                               75                               80
Phe Ile Leu Ala Phe Ser Leu Ile Ser Lys Ala Ser Tyr Glu Asn Val
   85                               90                               95
Ser Lys Lys Trp Ile Pro Glu Leu Thr His Tyr Ala Pro Gly Val Pro
   100                               105                               110
Ile Val Leu Val Gly Thr Lys Leu Asp Leu Arg Asp Asp Lys Gln Phe
   115                               120                               125
Phe Val Asp His Pro Gly Ala Val Pro Ile Thr Thr Ser Gln Gly Glu
   130                               135                               140
Glu Leu Met Lys Leu Ile Gly Ala Pro Ser Tyr Ile Glu Cys Ser Ser
   145                               150                               155                               160
Lys Ser Gln Glu Asn Val Lys Gly Val Phe Asp Ala Ala Ile Arg Val
   165                               170                               175
Val Leu Gln Pro Pro Lys Gln Lys Lys Lys Lys Ser Lys Ala Gln Lys
   180                               185                               190
Ala Cys Ser Ile Leu
   195

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<210> 75

<211> 645

<212> DNA

<213> Oryza sativa

<220>

<221> CDS

<222> (1)...(645)

<400> 75

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atg agc tcg gcg gcg gcg gcg acg agg ttc atc aag tgc gtc acc gtg      48
Met Ser Ser Ala Ala Ala Ala Thr Arg Phe Ile Lys Cys Val Thr Val
1          5          10          15
ggg gac ggc gcg gtg ggg aag acg tgc atg ctc atc tgc tac acc tgc      96
Gly Asp Gly Ala Val Gly Lys Thr Cys Met Leu Ile Cys Tyr Thr Cys
20          25          30
aac aag ttc ccc acc gat tac atc ccc acc gtg ttc gac aac ttc agc      144
Asn Lys Phe Pro Thr Asp Tyr Ile Pro Thr Val Phe Asp Asn Phe Ser
35          40          45
gcc aat gtc tcc gtg gac ggg agc gtc gtc aac ctc ggc ctc tgg gac      192
Ala Asn Val Ser Val Asp Gly Ser Val Val Asn Leu Gly Leu Trp Asp
50          55          60
act gca ggt cag gag gat tac agc agg ttg agg cct ctg agc tac agg      240
Thr Ala Gly Gln Glu Asp Tyr Ser Arg Leu Arg Pro Leu Ser Tyr Arg
65          70          75          80
gga gcc gat gtg ttc atc ctg tcc ttc tcc ctg ata agc agg gcg agc      288
Gly Ala Asp Val Phe Ile Leu Ser Phe Ser Leu Ile Ser Arg Ala Ser
85          90          95
tat gag aat gtt cag aag aag tgg atg cca gag ctt cgc cgg ttt gcg      336
Tyr Glu Asn Val Gln Lys Lys Trp Met Pro Glu Leu Arg Arg Phe Ala
100          105          110
cct ggt gtt cct gta gtt ctt gtt gga acc aag ttg gat ctc cgt gaa      384
Pro Gly Val Pro Val Val Leu Val Gly Thr Lys Leu Asp Leu Arg Glu
115          120          125
gat agg gcc tat ctt gct gat cat cca gct tct tcc ata ata aca acg      432
Asp Arg Ala Tyr Leu Ala Asp His Pro Ala Ser Ser Ile Ile Thr Thr
130          135          140
gag cag gga gaa gaa ctg agg aag cta ata gga gcg gtc gcc tac atc      480
Glu Gln Gly Glu Glu Arg Lys Leu Ile Gly Ala Val Ala Tyr Ile
145          150          155          160
gaa tgc agc tcc aag aca cag aga aac att aaa gct gtt ttc gac act      528
Glu Cys Ser Ser Lys Thr Gln Arg Asn Ile Lys Ala Val Phe Asp Thr
165          170          175
gcc atc aaa gtg gtg ctt caa cct cca aga cat aag gat gta acc aga      576
Ala Ile Lys Val Val Leu Gln Pro Pro Arg His Lys Asp Val Thr Arg
180          185          190
aag aaa ctc caa tca agc tcc aat cgg cca gta agg cgg tac ttt tgc      624
Lys Lys Leu Gln Ser Ser Ser Asn Arg Pro Val Arg Arg Tyr Phe Cys
195          200          205
gga agc gct tgt ttc gcg tag      645
Gly Ser Ala Cys Phe Ala
210

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<210> 76

<211> 214

<212> PRT

<213> Oryza sativa

<400> 76

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Met Ser Ser Ala Ala Ala Ala Thr Arg Phe Ile Lys Cys Val Thr Val
1          5          10          15
Gly Asp Gly Ala Val Gly Lys Thr Cys Met Leu Ile Cys Tyr Thr Cys
20          25          30
Asn Lys Phe Pro Thr Asp Tyr Ile Pro Thr Val Phe Asp Asn Phe Ser
35          40          45
Ala Asn Val Ser Val Asp Gly Ser Val Val Asn Leu Gly Leu Trp Asp
50          55          60
Thr Ala Gly Gln Glu Asp Tyr Ser Arg Leu Arg Pro Leu Ser Tyr Arg
65          70          75          80
Gly Ala Asp Val Phe Ile Leu Ser Phe Ser Leu Ile Ser Arg Ala Ser
85          90          95
Tyr Glu Asn Val Gln Lys Lys Trp Met Pro Glu Leu Arg Arg Phe Ala
100          105          110

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Pro Gly Val Pro Val Val Leu Val Gly Thr Lys Leu Asp Leu Arg Glu
 115 120 125
 Asp Arg Ala Tyr Leu Ala Asp His Pro Ala Ser Ser Ile Ile Thr Thr
 130 135 140
 Glu Gln Gly Glu Glu Leu Arg Lys Leu Ile Gly Ala Val Ala Tyr Ile
 145 150 155 160
 Glu Cys Ser Ser Lys Thr Gln Arg Asn Ile Lys Ala Val Phe Asp Thr
 165 170 175
 Ala Ile Lys Val Val Leu Gln Pro Pro Arg His Lys Asp Val Thr Arg
 180 185 190
 Lys Lys Leu Gln Ser Ser Ser Asn Arg Pro Val Arg Arg Tyr Phe Cys
 195 200 205
 Gly Ser Ala Cys Phe Ala
 210

<210> 77

<211> 1135

<212> DNA

<213> Homo sapiens (man)

<220>

<221> CDS

<222> (105)..(680)

<400> 77

ggcagccgag gagacccccg gcagtgctgc caacgccccg gtggagaagc tgaggtcatc 60

atcagatttg aaatatattaa agtggataca aaactatttc agca atg cag aca att 116
 Met Gln Thr Ile
 1

aag tgt gtt gtt gtg ggc gat ggt gct gtt ggt aaa aca tgt ctc ctg 164
 Lys Cys Val Val Val Gly Asp Gly Ala Val Gly Lys Thr Cys Leu Leu
 5 10 15 20

ata tcc tac aca aca aac aaa ttt cca tcg gaa tat gta ccg act gtt 212
 Ile Ser Tyr Thr Thr Asn Lys Phe Pro Ser Glu Tyr Val Pro Thr Val
 25 30 35

ttt gac aac tat gca gtc aca gtt atg att ggt gga gaa cca tat act 260
 Phe Asp Asn Tyr Ala Val Thr Val Met Ile Gly Gly Glu Pro Tyr Thr
 40 45 50

ctt gga ctt ttt gat act gca ggg caa gag gat tat gac aga tta cga 308
 Leu Gly Leu Phe Asp Thr Ala Gly Gln Glu Asp Tyr Asp Arg Leu Arg
 55 60 65

ccg ctg agt tat cca caa aca gat gta ttt cta gtc tgt ttt tca gtg 356
 Pro Leu Ser Tyr Pro Gln Thr Asp Val Phe Leu Val Cys Phe Ser Val
 70 75 80

gtc tct cca tct tca ttt gaa aac gtg aaa gaa aag tgg gtg cct gag 404
 Val Ser Pro Ser Ser Phe Glu Asn Val Lys Glu Lys Trp Val Pro Glu
 85 90 95 100

ata act cac cac tgt cca aag act cct ttc ttg ctt gtt ggg act caa 452
 Ile Thr His His Cys Pro Lys Thr Pro Phe Leu Leu Val Gly Thr Gln
 105 110 115

att gat ctc aga gat gac ccc tct act att gag aaa ctt gcc aag aac 500
 Ile Asp Leu Arg Asp Asp Pro Ser Thr Ile Glu Lys Leu Ala Lys Asn
 120 125 130

aaa cag aag cct atc act cca gag act gct gaa aag ctg gcc cgt gac 548
 Lys Gln Lys Pro Ile Thr Pro Glu Thr Ala Glu Lys Leu Ala Arg Asp
 135 140 145

ctg aag gct gtc aag tat gtg gag tgt tct gca ctt aca cag aga ggt 596
 Leu Lys Ala Val Lys Tyr Val Glu Cys Ser Ala Leu Thr Gln Arg Gly
 150 155 160

ctg aag aat gtg ttt gat gag gct atc cta gct gcc ctc gag cct ccg 644
 Leu Lys Asn Val Phe Asp Glu Ala Ile Leu Ala Ala Leu Glu Pro Pro
 165 170 175 180

gaa act caa ccc aaa agg aag tgc tgt ata ttc taaactgttt tctccttccc 697
 Glu Thr Gln Pro Lys Arg Lys Cys Cys Ile Phe
 185 190

ttctttgctg ctgcttcctg tccactact gtagaagat cgtttaaaaa caaaggaata 757

aaaccatcct gtttgaaagc ctctgcgtct ttttactcac caccttagag caacctctgt 817
 attagttttt gatcaagaat tgcaatatca tataaatttt ttgtgacag tagtcaagtt 877
 ggacttgttt taacgttctg ctgcttgagt tgcctgatgc tcagagcttt ttggtttgga 937
 ttactattgc aaagggaact tgggtctggct tagatgtcct cttggagaaa ataacaagag 997
 ttttaacact tctagatctt agttcagatg gagaaagtaa cacaacatc attttactct 1057
 tatgatcaat tggttaattgt aattgcatga caaaccttat ggaaaagggg tgacctagta 1117
 gagtgtaatg gggaaggg 1135

<210> 78
 <211> 191
 <212> PRT
 <213> Homo sapiens (man)

<400> 78
 Met Gln Thr Ile Lys Cys Val Val Val Gly Asp Gly Ala Val Gly Lys
 1 5 10 15
 Thr Cys Leu Leu Ile Ser Tyr Thr Thr Asn Lys Phe Pro Ser Glu Tyr
 20 25 30
 Val Pro Thr Val Phe Asp Asn Tyr Ala Val Thr Val Met Ile Gly Gly
 35 40 45
 Glu Pro Tyr Thr Leu Gly Leu Phe Asp Thr Ala Gly Gln Glu Asp Tyr
 50 55 60
 Asp Arg Leu Arg Pro Leu Ser Tyr Pro Gln Thr Asp Val Phe Leu Val
 65 70 75 80
 Cys Phe Ser Val Val Ser Pro Ser Ser Phe Glu Asn Val Lys Glu Lys
 85 90 95
 Trp Val Pro Glu Ile Thr His His Cys Pro Lys Thr Pro Phe Leu Leu
 100 105 110
 Val Gly Thr Gln Ile Asp Leu Arg Asp Asp Pro Ser Thr Ile Glu Lys
 115 120 125
 Leu Ala Lys Asn Lys Gln Lys Pro Ile Thr Pro Glu Thr Ala Glu Lys
 130 135 140
 Leu Ala Arg Asp Leu Lys Ala Val Lys Tyr Val Glu Cys Ser Ala Leu
 145 150 155 160
 Thr Gln Arg Gly Leu Lys Asn Val Phe Asp Glu Ala Ile Leu Ala Ala
 165 170 175
 Leu Glu Pro Pro Glu Thr Gln Pro Lys Arg Lys Cys Cys Ile Phe
 180 185 190

<210> 79
 <211> 576
 <212> DNA
 <213> Caenorhabditis elegans

<220>
 <221> CDS
 <222> (1)..(576)

<400> 79
 atg caa gcg atc aaa tgt gtc gtc gtt ggt gac gga gcc gtc ggt aaa 48
 Met Gln Ala Ile Lys Cys Val Val Val Gly Asp Gly Ala Val Gly Lys

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1	5	10	15	
acg tgt ctc ctg ata tcc tac acc aca aac gca ttt ccc gga gaa tat				96
Thr Cys Leu Leu Ile Ser Tyr Thr Thr Asn Ala Phe Pro Gly Glu Tyr				
20	25	30		
att ccg acg gta ttc gac aac tac tca gca aat gtg atg gtc gac ggt				144
Ile Pro Thr Val Phe Asp Asn Tyr Ser Ala Asn Val Met Val Asp Gly				
35	40	45		
cgg ccg ata aat ctc ggg ctc tgg gat aca gct gga cag gaa gat tac				192
Arg Pro Ile Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln Glu Asp Tyr				
50	55	60		
gat cga ctc cga cca ctg tca tat cca caa aca gac gtg ttt ctc gta				240
Asp Arg Leu Arg Pro Leu Ser Tyr Pro Gln Thr Asp Val Phe Leu Val				
65	70	75	80	
tgc ttt gcc ctg aac aat ccg gcg agt ttt gag aat gtt cgt gcg aaa				288
Cys Phe Ala Leu Asn Asn Pro Ala Ser Phe Glu Asn Val Arg Ala Lys				
85	90	95		
tgg tat cca gaa gtg tca cat cat tgc ccg aat acg ccg att att ttg				336
Trp Tyr Pro Glu Val Ser His His Cys Pro Asn Thr Pro Ile Ile Leu				
100	105	110		
gtt gga acg aaa gct gat ctg cgt gag gat cga gat act gtt gaa cgg				384
Val Gly Thr Lys Ala Asp Leu Arg Glu Asp Arg Asp Thr Val Glu Arg				
115	120	125		
ctc cgc gaa cgc cgg ctc caa cca gtg agc caa acc cag ggc tac gtg				432
Leu Arg Arg Arg Arg Leu Gln Pro Val Ser Gln Thr Gln Gly Tyr Val				
130	135	140		
atg gca aag gaa atc aag gct gtc aag tat ctg gag tgc tcg gcg ctc				480
Met Ala Lys Glu Ile Lys Ala Val Lys Tyr Leu Glu Cys Ser Ala Leu				
145	150	155	160	
acg caa cgt ggt ctg aaa caa gtt ttc gat gag gcg atc cga gcc gtc				528
Thr Gln Arg Gly Leu Lys Gln Val Phe Asp Glu Ala Ile Arg Ala Val				
165	170	175		
gtc acg ccg cca caa aga gcc aaa aag agc aag tgt acg gtg ctc				573
Val Thr Pro Pro Gln Arg Ala Lys Lys Ser Lys Cys Thr Val Leu				
180	185	190		
taa				576

<210> 80

<211> 191

<212> PRT

<213> Caenorhabditis elegans

<400> 80

Met Gln Ala Ile Lys Cys Val Val Val Gly Asp Gly Ala Val Gly Lys	
1	5
Thr Cys Leu Leu Ile Ser Tyr Thr Thr Asn Ala Phe Pro Gly Glu Tyr	10
20	25
Ile Pro Thr Val Phe Asp Asn Tyr Ser Ala Asn Val Met Val Asp Gly	30
35	40
Arg Pro Ile Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln Glu Asp Tyr	45
50	55
Asp Arg Leu Arg Pro Leu Ser Tyr Pro Gln Thr Asp Val Phe Leu Val	60
65	70
Cys Phe Ala Leu Asn Asn Pro Ala Ser Phe Glu Asn Val Arg Ala Lys	75
85	90
Trp Tyr Pro Glu Val Ser His His Cys Pro Asn Thr Pro Ile Ile Leu	95
100	105
Val Gly Thr Lys Ala Asp Leu Arg Glu Asp Arg Asp Thr Val Glu Arg	110
115	120
Leu Arg Glu Arg Arg Leu Gln Pro Val Ser Gln Thr Gln Gly Tyr Val	125
130	135
Met Ala Lys Glu Ile Lys Ala Val Lys Tyr Leu Glu Cys Ser Ala Leu	140
145	150
Thr Gln Arg Gly Leu Lys Gln Val Phe Asp Glu Ala Ile Arg Ala Val	155
165	170
Val Thr Pro Pro Gln Arg Ala Lys Lys Ser Lys Cys Thr Val Leu	175

<210> 81
 <211> 579
 <212> DNA
 <213> *Caenorhabditis elegans*

<220>
 <221> CDS
 <222> (1) .. (579)

<400> 81
 atg gct gcg att aga aag aag ttg gtg atc gtc ggc gac gga gcc tgc 48
 Met Ala Ala Ile Arg Lys Lys Leu Val Ile Val Gly Asp Gly Ala Cys
 1 5 10 15
 ggt aaa act tgc ctg ctc atc gtt ttc tca aag gat cag ttc cca gac 96
 Gly Lys Thr Cys Leu Leu Ile Val Phe Ser Lys Asp Gln Phe Pro Asp
 20 25 30
 gtg tat gtg ccg act gtt ttc gag aat tat gtt gcc gac att gaa gtt 144
 Val Tyr Val Pro Thr Val Phe Glu Asn Tyr Val Ala Asp Ile Glu Val
 35 40 45
 gac gga aag cag gtc gaa ctt gct cta tgg gat aca gct gga caa gag 192
 Asp Gly Lys Gln Val Glu Leu Ala Leu Trp Asp Thr Ala Gly Gln Glu
 50 55 60
 gac tat gat cgt ctg cgt cca ctc tct tat ccg gat act gac gtc att 240
 Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Asp Thr Asp Val Ile
 65 70 75 80
 ctg atg tgc ttc tca att gat tca ccc gat tca ctg gag aat att cca 288
 Leu Met Cys Phe Ser Ile Asp Ser Pro Asp Ser Leu Glu Asn Ile Pro
 85 90 95
 gaa aaa tgg aca cca gaa gtc agg cat ttc tgt cca aat gtt ccg att 336
 Glu Lys Trp Thr Pro Glu Val Arg His Phe Cys Pro Asn Val Pro Ile
 100 105 110
 att ttg gtc gga aat aaa cga gat ctt cgt agt gat cca cag act gtt 384
 Ile Leu Val Gly Asn Lys Arg Asp Leu Arg Ser Asp Pro Gln Thr Val
 115 120 125
 cga gaa ttg gca aaa atg aaa cag gag ccc gtg aag cct gag cag gga 432
 Arg Glu Leu Ala Lys Met Lys Gln Glu Pro Val Lys Pro Glu Gln Gly
 130 135 140
 cga gca att gct gag caa att gga gca ttt gca tat ttg gag tgc tct 480
 Arg Ala Ile Ala Glu Gln Ile Gly Ala Phe Ala Tyr Leu Glu Cys Ser
 145 150 155 160
 gcg aag act aag gac gga att cgt gag gta ttc gag aag gcg aca cag 528
 Ala Lys Thr Lys Asp Gly Ile Arg Glu Val Phe Glu Lys Ala Thr Gln
 165 170 175
 gcg gca ttg caa cag aag aag aaa aag aag agc aag tgc atg att ttg 576
 Ala Ala Leu Gln Lys Lys Lys Lys Lys Ser Lys Cys Met Ile Leu
 180 185 190
 taa 579

<210> 82
 <211> 192
 <212> PRT
 <213> *Caenorhabditis elegans*

<400> 82
 Met Ala Ala Ile Arg Lys Lys Leu Val Ile Val Gly Asp Gly Ala Cys
 1 5 10 15
 Gly Lys Thr Cys Leu Leu Ile Val Phe Ser Lys Asp Gln Phe Pro Asp
 20 25 30
 Val Tyr Val Pro Thr Val Phe Glu Asn Tyr Val Ala Asp Ile Glu Val
 35 40 45
 Asp Gly Lys Gln Val Glu Leu Ala Leu Trp Asp Thr Ala Gly Gln Glu
 50 55 60
 Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Asp Thr Asp Val Ile

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65	70	75	80
Leu Met Cys Phe Ser Ile Asp Ser Pro Asp Ser Leu Glu Asn Ile Pro			
	85	90	95
Glu Lys Trp Thr Pro Glu Val Arg His Phe Cys Pro Asn Val Pro Ile			
	100	105	110
Ile Leu Val Gly Asn Lys Arg Asp Leu Arg Ser Asp Pro Gln Thr Val			
	115	120	125
Arg Glu Leu Ala Lys Met Lys Gln Glu Pro Val Lys Pro Glu Gln Gly			
	130	135	140
Arg Ala Ile Ala Glu Gln Ile Gly Ala Phe Ala Tyr Leu Glu Cys Ser			
	145	150	155
Ala Lys Thr Lys Asp Gly Ile Arg Glu Val Phe Glu Lys Ala Thr Gln			
	165	170	175
Ala Ala Leu Gln Gln Lys Lys Lys Lys Lys Ser Lys Cys Met Ile Leu			
	180	185	190

<210> 83

<211> 928

<212> DNA

<213> Schizosaccharomyces pombe

<220>

<221> CDS

<222> (55)..(633)

<400> 83

gaattcaata aagtgaagca aagctttacg attaatatt tttgtgaaa tagt atg	57
Met	
1	
ccc acc att aag tgt gtc gta gta gga gac ggt yct gta gga aag acc	105
Pro Thr Ile Lys Cys Val Val Val Gly Asp Gly Ala Val Gly Lys Thr	
5	
10	
15	
tgt ctg ctt att tcc tat act aca aac aag ttt cct agt gac tat gtg	153
Cys Leu Leu Ile Ser Tyr Thr Thr Asn Lys Phe Pro Ser Asp Tyr Val	
20	
25	
30	
cca act gta ttc gat aat tat gct gtc act gtc atg atc ggt gat gaa	201
Pro Thr Val Phe Asp Asn Tyr Ala Val Thr Val Met Ile Gly Asp Glu	
35	
40	
45	
cca tac act ctt ggt tta ttc gat acc gct ggt cag gag gat tat gat	249
Pro Tyr Thr Leu Gly Leu Phe Asp Thr Ala Gly Gln Glu Asp Tyr Asp	
50	
55	
60	
65	
cgc ttg cgt cct tta tcc tat cct caa aca gac gtc ttt ttg gtt tgt	297
Arg Leu Arg Pro Leu Ser Tyr Pro Gln Thr Asp Val Phe Leu Val Cys	
70	
75	
80	
ttt agt gta act tct cct gcc agt ttt gaa aat gtg aaa gaa aag tgg	345
Phe Ser Val Thr Ser Pro Ala Ser Phe Glu Asn Val Lys Glu Lys Trp	
85	
90	
95	
ttt ccc gaa gtt cat cat cat tgt ccg ggc gtc ccg tgc tta att gtt	393
Phe Pro Glu Val His His His Cys Pro Gly Val Pro Cys Leu Ile Val	
100	
105	
110	
ggg acc caa att gat tta cgt gat gac cct tct gtg caa cag aaa cta	441
Gly Thr Gln Ile Asp Leu Arg Asp Asp Pro Ser Val Gln Gln Lys Leu	
115	
120	
125	
gct cgc cag cat cag cat ccc ctt aca cat gag caa ggt gaa cga tta	489
Ala Arg Gln His Gln His Pro Leu Thr His Glu Gln Gly Glu Arg Leu	
130	
135	
140	
145	
gct cgt gag ttg ggt gct gtc aag tat gtt gag tgt tcc gct ttg acc	537
Ala Arg Glu Leu Gly Ala Val Lys Tyr Val Glu Cys Ser Ala Leu Thr	
150	
155	
160	
caa aaa ggg tta aag aat gtt ttt gat gaa gct att gta gcc gct ctt	585
Gln Lys Gly Leu Lys Asn Val Phe Asp Glu Ala Ile Val Ala Ala Leu	
165	
170	
175	
gat cct cct gtt cct cac aag aaa aag tca aag tgt ttg gta ctg	630
Asp Pro Pro Val Pro His Lys Lys Lys Ser Lys Cys Leu Val Leu	
180	
185	
190	
taatttaacc ctgggttttct ttccttttcc gaaatttcc taatacagct agttttacaac	690

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agtaaacaat gtcttagctt tctttaacga tccctcatat ttgcaaagat atttgctatt 750
 tggtattttc atcctagctt ttgtgcttct tcattcattc tgtcaatcac acatttcttg 810
 ggctttacat atctgtgttt tctggctagg catatttctt ttttcggtta aataaacgac 870
 gatttttgcta tacttttgct acattattgt attctttctgc cattactcgc aggaattc 928

<210> 84

<211> 192

<212> PRT

<213> Schizosaccharomyces pombe

<400> 84

Met Pro Thr Ile Lys Cys Val Val Val Gly Asp Gly Ala Val Gly Lys
 1 5 10 15
 Thr Cys Leu Leu Ile Ser Tyr Thr Thr Asn Lys Phe Pro Ser Asp Tyr
 20 25 30
 Val Pro Thr Val Phe Asp Asn Tyr Ala Val Thr Val Met Ile Gly Asp
 35 40 45
 Glu Pro Tyr Thr Leu Gly Leu Phe Asp Thr Ala Gly Gln Glu Asp Tyr
 50 55 60
 Asp Arg Leu Arg Pro Leu Ser Tyr Pro Gln Thr Asp Val Phe Leu Val
 65 70 75 80
 Cys Phe Ser Val Thr Ser Pro Ala Ser Phe Glu Asn Val Lys Glu Lys
 85 90 95
 Trp Phe Pro Glu Val His His His Cys Pro Gly Val Pro Cys Leu Ile
 100 105 110
 Val Gly Thr Gln Ile Asp Leu Arg Asp Asp Pro Ser Val Gln Gln Lys
 115 120 125
 Leu Ala Arg Gln His Gln His Pro Leu Thr His Glu Gln Gly Glu Arg
 130 135 140
 Leu Ala Arg Glu Leu Gly Ala Val Lys Tyr Val Glu Cys Ser Ala Leu
 145 150 155 160
 Thr Gln Lys Gly Leu Lys Asn Val Phe Asp Glu Ala Ile Val Ala Ala
 165 170 175
 Leu Asp Pro Pro Val Pro His Lys Lys Lys Ser Lys Cys Leu Val Leu
 180 185 190

<210> 85

<211> 579

<212> DNA

<213> Mus musculus (house mouse)

<220>

<221> CDS

<222> (1)..(579)

<400> 85

atg cag gcc atc aag tgt gtg gtg gtg ggt gat gga gcc gtg ggc aag 48
 Met Gln Ala Ile Lys Cys Val Val Val Gly Asp Gly Ala Val Gly Lys
 1 5 10 15
 acg tgt ctt ctc atc agc tac acc acc aac gcc ttc cct gga gaa tac 96
 Thr Cys Leu Leu Ile Ser Tyr Thr Thr Asn Ala Phe Pro Gly Glu Tyr
 20 25 30
 atc ccc act gta ttt gac aac tac tca gcc aat gtg atg gtg gac agt 144
 Ile Pro Thr Val Phe Asp Asn Tyr Ser Ala Asn Val Met Val Asp Ser
 35 40 45
 aag ccg gtg aac ctg ggg ctg tgg gat acc gca ggt cag gag gac tat 192
 Lys Pro Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln Glu Asp Tyr
 50 55 60
 gac cgc ctc cgg cca ctc tcc tac cca cag aca gat gta ttt ctc atc 240

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Asp	Arg	Leu	Arg	Pro	Leu	Ser	Tyr	Pro	Gln	Thr	Asp	Val	Phe	Leu	Ile		
65					70				75						80		
tgc	ttc	tcg	cta	gtc	agc	cca	gcc	tcc	tat	gag	aat	gtc	cgt	gcc	aag		288
Cys	Phe	Ser	Leu	Val	Ser	Pro	Ala	Ser	Tyr	Glu	Asn	Val	Arg	Ala	Lys		
				85					90					95			
tgg	ttc	cct	gag	gta	cgg	cac	cac	tgc	ccc	agc	acc	ccc	atc	atc	ctg		336
Trp	Phe	Pro	Glu	Val	Arg	His	His	Cys	Pro	Ser	Thr	Pro	Ile	Ile	Leu		
				100				105						110			
gtg	ggt	acc	aag	ctg	gac	ctt	cgc	gat	gac	aag	gac	acc	atc	gag	aag		384
Val	Gly	Thr	Lys	Leu	Asp	Leu	Arg	Asp	Asp	Lys	Asp	Thr	Ile	Glu	Lys		
				115				120						125			
ctg	aag	gag	aag	aag	ctg	gct	ccc	atc	acc	tac	ccg	cag	ggc	ctg	gca		432
Leu	Lys	Glu	Lys	Lys	Leu	Ala	Pro	Ile	Thr	Tyr	Pro	Gln	Gly	Leu	Ala		
				130				135						140			
ctg	gcc	aag	gat	att	gat	tca	gtc	aag	tac	ttg	gaa	tgt	tct	gca	ctc		480
Leu	Ala	Lys	Asp	Ile	Asp	Ser	Val	Lys	Tyr	Leu	Glu	Cys	Ser	Ala	Leu		
				145				150						155		160	
acc	cag	cga	ggc	ctg	aag	acc	gtc	ttc	gat	gag	gca	atc	cgc	gca	gtc		528
Thr	Gln	Arg	Gly	Leu	Lys	Thr	Val	Phe	Asp	Glu	Ala	Ile	Arg	Ala	Val		
				165				170						175			
ctc	tgc	cca	cag	ccc	aca	cga	cag	cag	aag	cgc	ccc	tgc	agc	ctg	ctc		576
Leu	Cys	Pro	Gln	Pro	Thr	Arg	Gln	Gln	Lys	Arg	Pro	Cys	Ser	Leu	Leu		
				180				185						190			
tag																	579

<210> 86

<211> 192

<212> PRT

<213> Mus musculus (house mouse)

<400> 86

Met	Gln	Ala	Ile	Lys	Cys	Val	Val	Val	Gly	Asp	Gly	Ala	Val	Gly	Lys		
1				5					10					15			
Thr	Cys	Leu	Leu	Ile	Ser	Tyr	Thr	Thr	Asn	Ala	Phe	Pro	Gly	Glu	Tyr		
			20					25					30				
Ile	Pro	Thr	Val	Phe	Asp	Asn	Tyr	Ser	Ala	Asn	Val	Met	Val	Asp	Ser		
			35					40				45					
Lys	Pro	Val	Asn	Leu	Gly	Leu	Trp	Asp	Thr	Ala	Gly	Gln	Glu	Asp	Tyr		
			50					55				60					
Asp	Arg	Leu	Arg	Pro	Leu	Ser	Tyr	Pro	Gln	Thr	Asp	Val	Phe	Leu	Ile		
65					70				75					80			
Cys	Phe	Ser	Leu	Val	Ser	Pro	Ala	Ser	Tyr	Glu	Asn	Val	Arg	Ala	Lys		
				85					90					95			
Trp	Phe	Pro	Glu	Val	Arg	His	His	Cys	Pro	Ser	Thr	Pro	Ile	Ile	Leu		
			100					105						110			
Val	Gly	Thr	Lys	Leu	Asp	Leu	Arg	Asp	Lys	Asp	Thr	Ile	Glu	Lys			
			115					120						125			
Leu	Lys	Glu	Lys	Lys	Leu	Ala	Pro	Ile	Thr	Tyr	Pro	Gln	Gly	Leu	Ala		
			130					135						140			
Leu	Ala	Lys	Asp	Ile	Asp	Ser	Val	Lys	Tyr	Leu	Glu	Cys	Ser	Ala	Leu		
145					150				155					160			
Thr	Gln	Arg	Gly	Leu	Lys	Thr	Val	Phe	Asp	Glu	Ala	Ile	Arg	Ala	Val		
				165					170					175			
Leu	Cys	Pro	Gln	Pro	Thr	Arg	Gln	Gln	Lys	Arg	Pro	Cys	Ser	Leu	Leu		
			180					185						190			

<210> 87

<211> 840

<212> DNA

<213> Discopyge ommata

<220>

<221> CDS

<222> (97)..(675)

<400> 87

gaccggcgcg ccattggacg gtcgctagggc ggaggcggaa gggattgggtt gccgtgcgac 60

gtcagtcagg tgcttcagga gcgacggggc acagcg atg gca gcg atc cgg aag 114
Met Ala Ala Ile Arg Lys
1 5

aag ctc gtc atc gtt ggc gat gga gct tgt ggc aag acc tgc ctc ctg 162
Lys Leu Val Ile Val Gly Asp Gly Ala Cys Gly Lys Thr Cys Leu Leu
10 15 20

atc gtc ttc agc aag gac cag ttc ccg gag gtc tac gtc ccc act gtc 210
Ile Val Phe Ser Lys Asp Gln Phe Pro Glu Val Tyr Val Pro Thr Val
25 30 35

ttc gag aac tac gtg gca gac atc gag gtg gac ggg aag cag gtg gag 258
Phe Glu Asn Tyr Val Ala Asp Ile Glu Val Asp Gly Lys Gln Val Glu
40 45 50

ctc gct ctc tgg gac acg gct gga cag gag gac tat gac cgc ctg cga 306 ()
Leu Ala Leu Trp Asp Thr Ala Gly Gln Glu Asp Tyr Asp Arg Leu Arg
55 60 65 70

ccc ctc tcc tac cct gac acc gac gtc att ctg atg tgc ttt tct atc 354
Pro Leu Ser Tyr Pro Asp Thr Asp Val Ile Leu Met Cys Phe Ser Ile
75 80 85

gac agc ccc gac agc ttg gag aac att ccg gag aag tgg acc ccg gag 402
Asp Ser Pro Asp Ser Leu Glu Asn Ile Pro Glu Lys Trp Thr Pro Glu
90 95 100

gtg aag cac ttc tgc ccc aac atc ccc atc atc ctg gtg ggc aac aag 450
Val Lys His Phe Cys Pro Asn Ile Pro Ile Ile Leu Val Gly Asn Lys
105 110 115

aag act gcg ggg gac gag cac aca cgg agg gag cta gcc aag atg aag 498
Lys Thr Ala Gly Asp Glu His Thr Arg Arg Glu Leu Ala Lys Met Lys
120 125 130

cag gag cct gtc aaa cca gat gat gcc aag gag atg ggg agc cgc atc 546
Gln Glu Pro Val Lys Pro Asp Asp Ala Lys Glu Met Gly Ser Arg Ile
135 140 145 150

aaa gcc ttt ggc tac ctg gaa tgc tca gcg aag acg aag gaa ggc gtg 594
Lys Ala Phe Gly Tyr Leu Glu Cys Ser Ala Lys Thr Lys Glu Gly Val
155 160 165

cgc gag gtc ttt gag ctg gcc tcg cgc gct gct ctg cag gcc aag aaa 642
Arg Glu Val Phe Glu Leu Ala Ser Arg Ala Ala Leu Gln Ala Lys Lys
170 175 180

acc aag agc aag agc ccc tgt ctg ctt ctg tgagcaggag ctcccagcta 692
Thr Lys Ser Lys Ser Pro Cys Leu Leu Leu
185 190

tccccacttc tctctgcttc tgctcactct ccgtcctccc cctctcccat tccttctctt 752

tcctccctcg ttcttccctc tcttgtttct ccccatctct ctctccctc tcgttctttc 812

ctctctcttt gttttctctc ttgagcgc 840

<210> 88

<211> 192

<212> PRT

<213> Discopyge ommata

<400> 88

Met Ala Ala Ile Arg Lys Lys Leu Val Ile Val Gly Asp Gly Ala Cys
1 5 10 15

Gly Lys Thr Cys Leu Leu Ile Val Phe Ser Lys Asp Gln Phe Pro Glu
20 25 30

Val Tyr Val Pro Thr Val Phe Glu Asn Tyr Val Ala Asp Ile Glu Val
35 40 45

Asp Gly Lys Gln Val Glu Leu Ala Leu Trp Asp Thr Ala Gly Gln Glu
50 55 60

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Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Asp Thr Asp Val Ile
 65 70 75 80
 Leu Met Cys Phe Ser Ile Asp Ser Pro Asp Ser Leu Glu Asn Ile Pro
 85 90 95
 Glu Lys Trp Thr Pro Glu Val Lys His Phe Cys Pro Asn Ile Pro Ile
 100 105 110
 Ile Leu Val Gly Asn Lys Lys Thr Ala Gly Asp Glu His Thr Arg Arg
 115 120 125
 Glu Leu Ala Lys Met Lys Gln Glu Pro Val Lys Pro Asp Asp Ala Lys
 130 135 140
 Glu Met Gly Ser Arg Ile Lys Ala Phe Gly Tyr Leu Glu Cys Ser Ala
 145 150 155 160
 Lys Thr Lys Glu Gly Val Arg Glu Val Phe Glu Leu Ala Ser Arg Ala
 165 170 175
 Ala Leu Gln Ala Lys Lys Thr Lys Ser Lys Ser Pro Cys Leu Leu Leu
 180 185 190

<210> 89

<211> 697

<212> DNA

<213> Canis lupus familiaris (dog)

<220>

<221> CDS

<222> (1)..(582)

<400> 89

atg gct gcc atc cgg aag aaa ctg gtg att gtt ggt gat gga gcc tgt	48
Met Ala Ala Ile Arg Lys Lys Leu Val Ile Val Gly Asp Gly Ala Cys	
1 5 10 15	
ggt aag act tgt ttg ctc atc gtc ttt agc aag gac cag ttc cca gag	96
Gly Lys Thr Cys Leu Leu Ile Val Phe Ser Lys Asp Gln Phe Pro Glu	
20 25 30	
gtg tat gta ccc aca gtg ttt gag aac tat gtg gca gat att gaa gtt	144
Val Tyr Val Pro Thr Val Phe Glu Asn Tyr Val Ala Asp Ile Glu Val	
35 40 45	
gat gga aag cag gta gag ttg gct ttg tgg gat aca gct ggg cag gaa	192
Asp Gly Lys Gln Val Glu Leu Ala Leu Trp Asp Thr Ala Gly Gln Glu	
50 55 60	
gat tat gat cgc ttg agg cct ctc tcc tat cca gac act gat gtt ata	240
Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Asp Thr Asp Val Ile	
65 70 75 80	
ctg atg tgt ttc tct att gac agc cct gat agc tta gaa aac atc cca	288
Leu Met Cys Phe Ser Ile Asp Ser Pro Asp Ser Leu Glu Asn Ile Pro	
85 90 95	
gaa aaa tgg acc cca gaa gtc aag cac ttc tgt ccc aac gtg ccc atc	336
Glu Lys Trp Thr Pro Glu Val Lys His Phe Cys Pro Asn Val Pro Ile	
100 105 110	
atc ctg gtt ggg aac aag aag gat ctt cgg aat gat gag cac aca agg	384
Ile Leu Val Gly Asn Lys Lys Asp Leu Arg Asn Asp Glu His Thr Arg	
115 120 125	
cgg gag cta gcc aag atg aag cag gag ccg gtg aaa ccg aca gaa ggc	432
Arg Glu Leu Ala Lys Met Lys Gln Glu Pro Val Lys Pro Thr Glu Gly	
130 135 140	
aga gat atg gca aac agg att ggt gct ttt ggg tac atg gag tgt tca	480
Arg Asp Met Ala Asn Arg Ile Gly Ala Phe Gly Tyr Met Glu Cys Ser	
145 150 155 160	
gca aag acc aaa gat gga gtg agg gag gtt ttt gaa atg gcc acg aga	528
Ala Lys Thr Lys Asp Gly Val Arg Glu Val Phe Glu Met Ala Thr Arg	
165 170 175	
gct gct ctg caa gcc aga cgt ggg aag aaa tct ggg tgc ctt gtc	576
Ala Ala Leu Gln Ala Arg Arg Gly Lys Lys Lys Ser Gly Cys Leu Val	
180 185 190	
ttg tgaaccctg ctgcaagcac agccctcatg cggttaattt tgaagtgcgtg	629
Leu	
tttattaatc ttagtgtatg attactggcc tttttcattt atctataatt tacctaagat	689

tacaatc

697

<210> 90

<211> 193

<212> PRT

<213> Canis lupus familiaris (dog)

<400> 90

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Met Ala Ala Ile Arg Lys Lys Leu Val Ile Val Gly Asp Gly Ala Cys
1      5      10      15
Gly Lys Thr Cys Leu Leu Ile Val Phe Ser Lys Asp Gln Phe Pro Glu
20      25      30
Val Tyr Val Pro Thr Val Phe Glu Asn Tyr Val Ala Asp Ile Glu Val
35      40      45
Asp Gly Lys Gln Val Glu Leu Ala Leu Trp Asp Thr Ala Gly Gln Glu
50      55      60
Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Asp Thr Asp Val Ile
65      70      75      80
Leu Met Cys Phe Ser Ile Asp Ser Pro Asp Ser Leu Glu Asn Ile Pro
85      90      95
Glu Lys Trp Thr Pro Glu Val Lys His Phe Cys Pro Asn Val Pro Ile
100     105     110
Ile Leu Val Gly Asn Lys Lys Asp Leu Arg Asn Asp Glu His Thr Arg
115     120     125
Arg Glu Leu Ala Lys Met Lys Gln Glu Pro Val Lys Pro Thr Glu Gly
130     135     140
Arg Asp Met Ala Asn Arg Ile Gly Ala Phe Gly Tyr Met Glu Cys Ser
145     150     155     160
Ala Lys Thr Lys Asp Gly Val Arg Glu Val Phe Glu Met Ala Thr Arg
165     170     175
Ala Ala Leu Gln Ala Arg Arg Gly Lys Lys Lys Ser Gly Cys Leu Val
180     185     190
Leu

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<210> 91

<211> 705

<212> DNA

<213> Drosophila melanogaster

<220>

<221> CDS

<222> (25)..(603)

<400> 91

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tagcactcag tcagaaatcg aacc atg cag gcg atc aag tgc gtc gtc gtg      51
1      5      10      15      20      25
Met Gln Ala Ile Lys Cys Val Val Val
5
ggc gac gga gcc gtg gga aag acc tgc ctg ctg atc agc tac acg acc      99
Gly Asp Gly Ala Val Gly Lys Thr Cys Leu Leu Ile Ser Tyr Thr Thr
10      15      20      25
aat gcc ttt ccc ggc gag tac ata ccc acc gtg ttc gac aac tac tcg      147
Asn Ala Phe Pro Gly Glu Tyr Ile Pro Thr Val Phe Asp Asn Tyr Ser
30      35      40
gcc aac gtg atg gtg gac gcc aag ccc atc aac ctg ggc ctg tgg gat      195
Ala Asn Val Met Val Asp Ala Lys Pro Ile Asn Leu Gly Leu Trp Asp
45      50      55
acg gcc ggg cag gag gac tac gac cga ctg agg cca ctg tct tat ccc      243
Thr Ala Gly Gln Glu Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro
60      65      70
cag acc gat gtc ttc ctc atc tgc ttc tcg ctg gtg aat ccg gca tcg      291
Gln Thr Asp Val Phe Leu Ile Cys Phe Ser Leu Val Asn Pro Ala Ser
75      80      85
ttc gag aac gtg cgg gcc aag tgg tat ccg gag gtg cgc cac cac tgc      339

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Phe Glu Asn Val Arg Ala Lys Trp Tyr Pro Glu Val Arg His His Cys
90          95          100          105
ccc agc acg ccc atc atc ctg gtg ggc acc aag ctg gat ttg cgc gac      387
Pro Ser Thr Pro Ile Ile Leu Val Gly Thr Lys Leu Asp Leu Arg Asp
          110          115          120
gac aag aac aca atc gaa aag ctg agg gac aag aaa ctg gtg ccc atc      435
Asp Lys Asn Thr Ile Glu Lys Leu Arg Asp Lys Lys Leu Val Pro Ile
          125          130          135
acc tat ccg cag ggc ctg gcc atg gcc aag gaa atc gga gcg gtc aag      483
Thr Tyr Pro Gln Gly Leu Ala Met Ala Lys Glu Ile Gly Ala Val Lys
          140          145          150
tat ctg gag tgc tgc gcc ctg acg cag aag ggt ctg aaa acc gtt ttc      531
Tyr Leu Glu Cys Ser Ala Leu Thr Gln Lys Gly Leu Lys Thr Val Phe
          155          160          165
gac gag gcc atc cgg tgc gtt ttg tgc ccc gtg ctg cag ccc aag tcc      579
Asp Glu Ala Ile Arg Ser Val Leu Cys Pro Val Leu Gln Pro Lys Ser
170          175          180          185
aag cgc aag tgc gcc ctg ctc taaaagagtt agacagttgg tcggtggtgt      630
Lys Arg Lys Cys Ala Leu Leu
          190
tccaccgcag cgactcctgc ttaaagccta cactactcta ctctaaccta taataaccat      690

tatgtaacct aagcc      705

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<210> 92

<211> 192

<212> PRT

<213> *Drosophila melanogaster*

<400> 92

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Met Gln Ala Ile Lys Cys Val Val Val Gly Asp Gly Ala Val Gly Lys
1          5          10          15
Thr Cys Leu Leu Ile Ser Tyr Thr Thr Asn Ala Phe Pro Gly Glu Tyr
          20          25          30
Ile Pro Thr Val Phe Asp Asn Tyr Ser Ala Asn Val Met Val Asp Ala
          35          40          45
Lys Pro Ile Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln Glu Asp Tyr
          50          55          60
Asp Arg Leu Arg Pro Leu Ser Tyr Pro Gln Thr Asp Val Phe Leu Ile
65          70          75          80
Cys Phe Ser Leu Val Asn Pro Ala Ser Phe Glu Asn Val Arg Ala Lys
          85          90          95
Trp Tyr Pro Glu Val Arg His His Cys Pro Ser Thr Pro Ile Ile Leu
          100          105          110
Val Gly Thr Lys Leu Asp Leu Arg Asp Asp Lys Asn Thr Ile Glu Lys
          115          120          125
Leu Arg Asp Lys Lys Leu Val Pro Ile Thr Tyr Pro Gln Gly Leu Ala
          130          135          140
Met Ala Lys Glu Ile Gly Ala Val Lys Tyr Leu Glu Cys Ser Ala Leu
145          150          155          160
Thr Gln Lys Gly Leu Lys Thr Val Phe Asp Glu Ala Ile Arg Ser Val
          165          170          175
Leu Cys Pro Val Leu Gln Pro Lys Ser Lys Arg Lys Cys Ala Leu Leu
180          185          190

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<210> 93

<211> 801

<212> DNA

<213> *Drosophila melanogaster*

<220>

<221> CDS

<222> (160)..(735)

<400> 93
ctcgcacgca aagagctcgc tggagagaga gaacgctaac acaaaaggaa atagtagttt 60

tccgtacgta tcgagcccag cccagaaaag cggaaaacta aacggattcg acagcggttg 120

caaatttttaa ataactgagt catcacccct ctgcacaac atg caa acc atc aag 174
Met Gln Thr Ile Lys
1 5
tgc gtg gtc gtc ggc gac gga gcc gtg ggt aag aca tgc ctg ctc atc 222
Cys Val Val Val Gly Asp Gly Ala Val Gly Lys Thr Cys Leu Leu Ile
10 15 20
tcg tat aca acc aac aag ttc ccg tcg gag tac gtg ccc acg gtg ttc 270
Ser Tyr Thr Thr Asn Lys Phe Pro Ser Glu Tyr Val Pro Thr Val Phe
25 30 35
gac aac tat gcg gtc act gtg atg atc ggc ggt gag ccc tac aca ctg 318
Asp Asn Tyr Ala Val Thr Val Met Ile Gly Gly Glu Pro Tyr Thr Leu
40 45 50
ggc ctg ttc gat acg gcc gga cag gag gat tac gat cgg ctg cgt ccg 366
Gly Leu Phe Asp Thr Ala Gly Gln Glu Asp Tyr Arg Leu Arg Pro
55 60 65
ctc tcc tat ccg cag acg gat gtc ttc ctt gtc tgc ttt tcg gtg gtc 414
Leu Ser Tyr Pro Gln Thr Asp Val Phe Leu Val Cys Phe Ser Val Val
70 75 80 85
agt ccc agt tcc ttc gag aac gtc aag gag aag tgg gtg ccc gag att 462
Ser Pro Ser Ser Phe Glu Asn Val Lys Glu Lys Trp Val Pro Glu Ile
90 95 100
aca cac cat tgc caa aag acg ccg ttc ctg ctg gtg ggc aca cag att 510
Thr His His Cys Gln Lys Thr Pro Phe Leu Leu Val Gly Thr Gln Ile
105 110 115
gat ttg cgc gac gag aac agc acg ctg gag aag ctg gcc aag aac aag 558
Asp Leu Arg Asp Glu Asn Ser Thr Leu Glu Lys Leu Ala Lys Asn Lys
120 125 130
cag aag ccc atc acc atg gag cag gcc gag aag ctg gcc aag gag ctg 606
Gln Lys Pro Ile Thr Met Glu Gln Gly Glu Lys Leu Ala Lys Glu Leu
135 140 145
aag gcc gtc aag tac gtg gag tgc tcg gcc ttg aca cag aag gcc ctg 654
Lys Ala Val Lys Tyr Val Glu Cys Ser Ala Leu Thr Gln Lys Gly Leu
150 155 160 165
aaa aat gta ttc gac gag gcc atc ctg gcc gcc ctc gag cca cca gag 702
Lys Asn Val Phe Asp Glu Ala Ile Leu Ala Ala Leu Glu Pro Pro Glu
170 175 180
ccc aca aag aaa agg aag tgc aaa ttc tta taattctgct ttcctcacac 752
Pro Thr Lys Lys Arg Lys Cys Lys Phe Leu
185 190
gcggtatccc tttcattctg gctttctact atcgcaatga ctcttccc 801

<210> 94

<211> 191

<212> PRT

<213> *Drosophila melanogaster*

<400> 94

Met Gln Thr Ile Lys Cys Val Val Val Gly Asp Gly Ala Val Gly Lys
1 5 10 15
Thr Cys Leu Leu Ile Ser Tyr Thr Thr Asn Lys Phe Pro Ser Glu Tyr
20 25 30
Val Pro Thr Val Phe Asp Asn Tyr Ala Val Thr Val Met Ile Gly Gly
35 40 45
Glu Pro Tyr Thr Leu Gly Leu Phe Asp Thr Ala Gly Gln Glu Asp Tyr
50 55 60
Asp Arg Leu Arg Pro Leu Ser Tyr Pro Gln Thr Asp Val Phe Leu Val
65 70 75 80
Cys Phe Ser Val Val Ser Pro Ser Ser Phe Glu Asn Val Lys Glu Lys

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				85					90					95			
Trp	Val	Pro	Glu	Ile	Thr	His	His	Cys	Gln	Lys	Thr	Pro	Phe	Leu	Leu		
			100					105					110				
Val	Gly	Thr	Gln	Ile	Asp	Leu	Arg	Asp	Glu	Asn	Ser	Thr	Leu	Glu	Lys		
			115					120					125				
Leu	Ala	Lys	Asn	Lys	Gln	Lys	Pro	Ile	Thr	Met	Glu	Gln	Gly	Glu	Lys		
			130					135				140					
Leu	Ala	Lys	Glu	Leu	Lys	Ala	Val	Lys	Tyr	Val	Glu	Cys	Ser	Ala	Leu		
145						150				155					160		
Thr	Gln	Lys	Gly	Leu	Lys	Asn	Val	Phe	Asp	Glu	Ala	Ile	Leu	Ala	Ala		
				165					170					175			
Leu	Glu	Pro	Pro	Glu	Pro	Thr	Lys	Lys	Arg	Lys	Cys	Lys	Phe	Leu			
			180					185					190				

<210> 95

<211> 609

<212> DNA

<213> Schizosaccharomyces pombe

<220>

<221> CDS

<222> (1) .. (609)

<400> 95

atg	gcg	aca	gaa	ctt	cgc	aga	aag	ctc	ggt	att	gtg	gga	gat	ggg	gca		48
Met	Ala	Thr	Glu	Leu	Arg	Arg	Lys	Leu	Val	Ile	Val	Gly	Asp	Gly	Ala		
1				5				10					15				
tgt	ggg	aaa	aca	tgc	tta	tta	att	gta	ttt	tct	aaa	gga	acc	ttt	ccc		96
Cys	Gly	Lys	Thr	Cys	Leu	Leu	Ile	Val	Phe	Ser	Lys	Gly	Thr	Phe	Pro		
			20					25				30					
gag	gtc	tat	ggt	ccc	act	ggt	ttt	gaa	aat	tat	gta	gct	gat	ggt	gag		144
Glu	Val	Tyr	Val	Pro	Thr	Val	Phe	Glu	Asn	Tyr	Val	Ala	Asp	Val	Glu		
			35				40				45						
ggt	gat	gga	cgc	cac	ggt	gag	ttg	gct	ctt	tgg	gat	acg	gct	gga	caa		192
Val	Asp	Gly	Arg	His	Val	Glu	Leu	Ala	Leu	Trp	Asp	Thr	Ala	Gly	Gln		
			50			55		60									
gaa	gat	tac	gac	cgt	cta	cgt	ccc	ttg	tca	tat	cct	gac	tca	cat	ggt		240
Glu	Asp	Tyr	Asp	Arg	Leu	Arg	Pro	Leu	Ser	Tyr	Pro	Asp	Ser	His	Val		
65				70				75						80			
atc	ctt	att	tgc	ttt	gct	ggt	gat	tct	ccc	gat	tct	ctt	gac	aat	ggt		288
Ile	Leu	Ile	Cys	Phe	Ala	Val	Asp	Ser	Pro	Asp	Ser	Leu	Asp	Asn	Val		
				85				90						95			
caa	gaa	aaa	tgg	att	tcc	gag	ggt	ctc	cat	ttc	tgt	tcc	agt	ctt	cct		336
Gln	Glu	Lys	Trp	Ile	Ser	Glu	Val	Leu	His	Phe	Cys	Ser	Ser	Leu	Pro		
			100					105				110					
att	ttg	ctt	gtc	gct	tgc	aag	gct	gat	ctc	cgt	aac	gac	cca	aaa	att		384
Ile	Leu	Leu	Val	Ala	Cys	Lys	Ala	Asp	Leu	Arg	Asn	Asp	Pro	Lys	Ile		
			115				120					125					
att	gag	gag	tta	tcc	aag	act	aat	cag	cat	ccc	gtc	acc	aca	gaa	gaa		432
Ile	Glu	Glu	Leu	Ser	Lys	Thr	Asn	Gln	His	Pro	Val	Thr	Thr	Glu	Glu		
			130				135				140						
ggg	caa	gca	gta	gct	cag	aag	att	ggg	gct	tac	aaa	tac	ctt	gag	tgt		480
Gly	Gln	Ala	Val	Ala	Gln	Lys	Ile	Gly	Ala	Tyr	Lys	Tyr	Leu	Glu	Cys		
145				150				155						160			
tct	gcc	aag	acg	aat	gaa	ggg	ggt	cgt	gag	ggt	ttt	gaa	tca	gcc	act		528
Ser	Ala	Lys	Thr	Asn	Glu	Gly	Val	Arg	Glu	Val	Phe	Glu	Ser	Ala	Thr		
				165				170						175			
cgt	gct	gct	atg	ctc	aaa	cac	aag	ccc	aaa	gtg	aag	ccc	tct	agt	gga		576
Arg	Ala	Ala	Met	Leu	Lys	His	Lys	Pro	Lys	Val	Lys	Pro	Ser	Ser	Gly		
			180					185					190				
act	aag	aag	aag	aag	cgt	tgt	atc	ttg	ttg	taa							609
Thr	Lys	Lys	Lys	Lys	Arg	Cys	Ile	Leu	Leu								
			195				200										

<210> 96

<211> 202

<212> PRT

<213> Schizosaccharomyces pombe

<400> 96

Met Ala Thr Glu Leu Arg Arg Lys Leu Val Ile Val Gly Asp Gly Ala
 1 5 10 15
 Cys Gly Lys Thr Cys Leu Leu Ile Val Phe Ser Lys Gly Thr Phe Pro
 20 25 30
 Glu Val Tyr Val Pro Thr Val Phe Glu Asn Tyr Val Ala Asp Val Glu
 35 40 45
 Val Asp Gly Arg His Val Glu Leu Ala Leu Trp Asp Thr Ala Gly Gln
 50 55 60
 Glu Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Asp Ser His Val
 65 70 75 80
 Ile Leu Ile Cys Phe Ala Val Asp Ser Pro Asp Ser Leu Asp Asn Val
 85 90 95
 Gln Glu Lys Trp Ile Ser Glu Val Leu His Phe Cys Ser Ser Leu Pro
 100 105 110
 Ile Leu Leu Val Ala Cys Lys Ala Asp Leu Arg Asn Asp Pro Lys Ile
 115 120 125
 Ile Glu Glu Leu Ser Lys Thr Asn Gln His Pro Val Thr Thr Glu Glu
 130 135 140
 Gly Gln Ala Val Ala Gln Lys Ile Gly Ala Tyr Lys Tyr Leu Glu Cys
 145 150 155 160
 Ser Ala Lys Thr Asn Glu Gly Val Arg Glu Val Phe Glu Ser Ala Thr
 165 170 175
 Arg Ala Ala Met Leu Lys His Lys Pro Lys Val Lys Pro Ser Ser Gly
 180 185 190
 Thr Lys Lys Lys Lys Arg Cys Ile Leu Leu
 195 200

<210> 97

<211> 603

<212> DNA

<213> Schizosaccharomyces pombe

<220>

<221> CDS

<222> (1)..(603)

<400> 97

atg ttg caa tct caa ccg att aga agg aaa cta gta gtt gta ggc gat 48
 Met Leu Gln Ser Gln Pro Ile Arg Arg Lys Leu Val Val Val Gly Asp
 1 5 10 15
 ggt gcc tgc ggg aag acg tct ttg tta tcc gtt ttc act ttg gga tat 96
 Gly Ala Cys Gly Lys Thr Ser Leu Leu Ser Val Phe Thr Leu Gly Tyr
 20 25 30
 ttt cct act gaa tat gtt ccg act gtg ttt gaa aac tat gtt tca gat 144
 Phe Pro Thr Glu Tyr Val Pro Thr Val Phe Glu Asn Tyr Val Ser Asp
 35 40 45
 tgt cga gtt gat gga aaa tca gtt caa ctg gca ttg tgg gat acc gca 192
 Cys Arg Val Asp Gly Lys Ser Val Gln Leu Ala Leu Trp Asp Thr Ala
 50 55 60
 ggt caa gag gaa tat gag aga tta aga cca atg tct tac gct aaa gca 240
 Gly Gln Glu Glu Tyr Glu Arg Leu Arg Pro Met Ser Tyr Ala Lys Ala
 65 70 75 80
 cac att att ttg gtt ggg ttt gcg ata gac tct cct gat tca ctt gaa 288
 His Ile Ile Leu Val Gly Phe Ala Ile Asp Ser Pro Asp Ser Leu Glu
 85 90 95
 aat gtt tct acg aag tgg att gag gaa att aat aca ctt tgc cca aat 336
 Asn Val Ser Thr Lys Trp Ile Glu Glu Ile Asn Thr Leu Cys Pro Asn
 100 105 110
 gtt ccg ttt att tta gtg ggc atg aaa gcc gac tta agg tca gat ccc 384
 Val Pro Phe Ile Leu Val Gly Met Lys Ala Asp Leu Arg Ser Asp Pro
 115 120 125
 gtt gct att gaa gaa atg cga cgt cga aat caa aat ttt gta aaa tca 432
 Val Ala Ile Glu Glu Met Arg Arg Arg Asn Gln Asn Phe Val Lys Ser
 130 135 140
 caa cag gct gaa tta gta gct cag cgg att ggt gcg aga aag tat atg 480

Gln	Gln	Ala	Glu	Leu	Val	Ala	Gln	Arg	Ile	Gly	Ala	Arg	Lys	Tyr	Met	
145					150					155					160	
gaa	tgt	tct	tca	ttg	act	ggg	gac	ggc	gtg	gac	gat	gta	ttt	gaa	gct	528
Glu	Cys	Ser	Ser	Leu	Thr	Gly	Asp	Gly	Val	Asp	Asp	Val	Phe	Glu	Ala	
				165					170					175		
gct	act	agg	gca	gca	cta	aca	gtt	cgg	gat	tcg	gaa	aat	gac	aag	agt	576
Ala	Thr	Arg	Ala	Ala	Leu	Thr	Val	Arg	Asp	Ser	Glu	Asn	Asp	Lys	Ser	
			180					185					190			
tct	aca	aaa	tgc	tgc	atc	att	tca	taa								603
Ser	Thr	Lys	Cys	Cys	Ile	Ile	Ser									
		195					200									

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<210> 98
<211> 200
<212> PRT
<213> Schizosaccharomyces pombe
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<400>	.98															
Met	Leu	Gln	Ser	Gln	Pro	Ile	Arg	Arg	Lys	Leu	Val	Val	Val	Gly	Asp	
1				5					10					15		
Gly	Ala	Cys	Gly	Lys	Thr	Ser	Leu	Leu	Ser	Val	Phe	Thr	Leu	Gly	Tyr	
			20					25					30			
Phe	Pro	Thr	Glu	Tyr	Val	Pro	Thr	Val	Phe	Glu	Asn	Tyr	Val	Ser	Asp	
		35					40					45				
Cys	Arg	Val	Asp	Gly	Lys	Ser	Val	Gln	Leu	Ala	Leu	Trp	Asp	Thr	Ala	
	50					55					60					
Gly	Gln	Glu	Glu	Tyr	Glu	Arg	Leu	Arg	Pro	Met	Ser	Tyr	Ala	Lys	Ala	
65					70					75					80	
His	Ile	Ile	Leu	Val	Gly	Phe	Ala	Ile	Asp	Ser	Pro	Asp	Ser	Leu	Glu	
			85						90					95		
Asn	Val	Ser	Thr	Lys	Trp	Ile	Glu	Glu	Ile	Asn	Thr	Leu	Cys	Pro	Asn	
			100					105					110			
Val	Pro	Phe	Ile	Leu	Val	Gly	Met	Lys	Ala	Asp	Leu	Arg	Ser	Asp	Pro	
		115					120					125				
Val	Ala	Ile	Glu	Glu	Met	Arg	Arg	Arg	Asn	Gln	Asn	Phe	Val	Lys	Ser	
	130					135					140					
Gln	Gln	Ala	Glu	Leu	Val	Ala	Gln	Arg	Ile	Gly	Ala	Arg	Lys	Tyr	Met	
145					150					155					160	
Glu	Cys	Ser	Ser	Leu	Thr	Gly	Asp	Gly	Val	Asp	Asp	Val	Phe	Glu	Ala	
			165						170					175		
Ala	Thr	Arg	Ala	Ala	Leu	Thr	Val	Arg	Asp	Ser	Glu	Asn	Asp	Lys	Ser	
			180					185					190			
Ser	Thr	Lys	Cys	Cys	Ile	Ile	Ser									
		195					200									

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<210> 99
<211> 726
<212> DNA
<213> Entamoeba histolytica
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<220>  
<221> CDS  
<222> (97) .. (687)
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<400> 99
aaatgtaaaag aacattaaaa ataaaaaaac agtgaaaaga aatggattaa aaatagaatt 60

tcaaggaact	gaaactcgta	attcaaaaaga	aaacac	atg	caa	gct	gtc	aaa	tgt		114					
				Met	Gln	Ala	Val	Lys	Cys							
				1				5								
gtc	att	gtt	ggg	gat	gga	gct	gta	gga	aaa	act	tgt	ctt	tta	att	tct	162
Val	Ile	Val	Gly	Asp	Gly	Ala	Val	Gly	Lys	Thr	Cys	Leu	Leu	Ile	Ser	
			10					15					20			
tac	act	aca	aat	gca	ttt	cct	aat	gaa	tat	att	cca	aca	gta	ttt	gat	210
Tyr	Thr	Thr	Asn	Ala	Phe	Pro	Asn	Glu	Tyr	Ile	Pro	Thr	Val	Phe	Asp	
		25					30					35				

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aat tat tct gct act gtt atg gtt gat tca aaa cca att aat ctt gga	258
Asn Tyr Ser Ala Thr Val Met Val Asp Ser Lys Pro Ile Asn Leu Gly	
40 45 50	
ctt tgg gat act gct gga caa gaa gat tat gat aga tta aga cca ttg	306
Leu Trp Asp Thr Ala Gly Gln Glu Asp Tyr Asp Arg Leu Arg Pro Leu	
55 60 65 70	
tca tat cca caa acc gat gta ttc tta att tgt ttc tca gtt gtt tct	354
Ser Tyr Pro Gln Thr Asp Val Phe Leu Ile Cys Phe Ser Val Val Ser	
75 80 85	
cca cca tca ttt gat aat gtc tca tct aaa tgg caa cca gaa gtt tct	402
Pro Pro Ser Phe Asp Asn Val Ser Ser Lys Trp Gln Pro Glu Val Ser	
90 95 100	
cat cat tgt cca aag act cct tgt tta tta gtt gga act aaa ctt gat	450
His His Cys Pro Lys Thr Pro Cys Leu Leu Val Gly Thr Lys Leu Asp	
105 110 115	
atg aga gaa gat aaa gaa caa tta aag aga tta gaa gag aaa aaa att	498
Met Arg Glu Asp Lys Glu Gln Leu Lys Arg Leu Glu Glu Lys Lys Ile	
120 125 130	
act cca atc act act gaa caa ggt gag gct aaa tgc aaa gat att gga	546
Thr Pro Ile Thr Thr Glu Gln Gly Glu Ala Lys Cys Lys Asp Ile Gly	
135 140 145 150	
gct gtt aag tat atc gaa tgt tct gct tta act caa aag aat tta aga	594
Ala Val Lys Tyr Ile Glu Cys Ser Ala Leu Thr Gln Lys Asn Leu Arg	
155 160 165	
ctt gtt ttt gat gaa gct gtt aga gca gtt att tct cct gca ggt gga	642
Leu Val Phe Asp Glu Ala Val Arg Ala Val Ile Ser Pro Ala Gly Gly	
170 175 180	
gca aaa aag gat aaa aag aat aat aga gga tgt tta tta ttc taaattcgat	694
Ala Lys Lys Asp Lys Lys Asn Asn Arg Gly Cys Leu Leu Phe	
185 190 195	
tcatttccttt tttaaacaac ttacaaacaa ta	726

<210> 100

<211> 196

<212> PRT

<213> Entamoeba histolytica

<400> 100

Met Gln Ala Val Lys Cys Val Ile Val Gly Asp Gly Ala Val Gly Lys	
1 5 10 15	
Thr Cys Leu Leu Ile Ser Tyr Thr Thr Asn Ala Phe Pro Asn Glu Tyr	
20 25 30	
Ile Pro Thr Val Phe Asp Asn Tyr Ser Ala Thr Val Met Val Asp Ser	
35 40 45	
Lys Pro Ile Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln Glu Asp Tyr	
50 55 60	
Asp Arg Leu Arg Pro Leu Ser Tyr Pro Gln Thr Asp Val Phe Leu Ile	
65 70 75 80	
Cys Phe Ser Val Val Ser Pro Pro Ser Phe Asp Asn Val Ser Ser Lys	
85 90 95	
Trp Gln Pro Glu Val Ser His His Cys Pro Lys Thr Pro Cys Leu Leu	
100 105 110	
Val Gly Thr Lys Leu Asp Met Arg Glu Asp Lys Glu Gln Leu Lys Arg	
115 120 125	
Leu Glu Glu Lys Lys Ile Thr Pro Ile Thr Thr Glu Gln Gly Glu Ala	
130 135 140	
Lys Cys Lys Asp Ile Gly Ala Val Lys Tyr Ile Glu Cys Ser Ala Leu	
145 150 155 160	
Thr Gln Lys Asn Leu Arg Leu Val Phe Asp Glu Ala Val Arg Ala Val	
165 170 175	
Ile Ser Pro Ala Gly Gly Ala Lys Lys Asp Lys Lys Asn Asn Arg Gly	
180 185 190	
Cys Leu Leu Phe	
195	

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<220>  
<221> CDS  
<222> (145) .. (729)
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<400>	101
aatatataatc ttaaaataga aagaactgca aaaactaaaa aacataaaaa aagaaactct	60
agaaaagcta ttaaagtaac gaaaaaaaaaca tgaaacaaag aaataataga caactcagaa	120
ctaaaaaaaaag ttgaaagaaa atca atg agt gaa aaa ccc aca tca .atc. aaa.	171
Met Ser Glu Lys Pro Thr Ser Ile Lys	
1 5	
tta gtc gtt gtt ggg gat ggt gct gtt gga aaa aca tgt tta tta att	219
Leu Val Val Val Gly Asp Gly Ala Val Gly Lys Thr Cys Leu Leu Ile	
10 15 20 25	
tgc tat aca actaat gaa tttcca aaa gat tatatt cctaca gtatttc	267
Cys Tyr Thr Thr Asn Glu Phe Pro Lys Asp Tyr Ile Pro Thr Val Phe	
30 35 40	
gat aat tat gttgtg tcat taact gca ggc acaga caa attcaa ttg	315
Asp Asn Tyr Val Val Ser Leu Thr Ala Gly Thr Arg Gln Ile Gln Leu	
45 50 55	
gcg ttgttg gat actgct gga caa gaaggat gatcaa ttg aga cca	363
Ala Leu Trp Asp Thr Ala Gly Gln Glu Glu Tyr Asp Gln Leu Arg Pro	
60 65 70	
ttg agt tat tcagt ctgt cat ata ttttta ata tgtttc tct gtcaca	411
Leu Ser Tyr Ser Ser Ala Ser Ile Phe Leu Ile Cys Phe Ser Val Thr	
75 80 85	
agt tct gtatcat tat gat aat gta attaca aaa tggcac cct gaa gtt	459
Ser Ser Val Ser Tyr Asp Asn Val Ile Thr Lys Trp His Pro Glu Val	
90 95 100 105	
att cac ttt gcacca aaa gttcct attatata tta gttgga aca aaa ctt	507
Ile His Phe Ala Pro Lys Val Pro Ile Ile Leu Val Gly Thr Lys Leu	
110 115 120	
gat act agaat gat cct gct attgtt aaa aga ttaaca gaa cag ggt	555
Asp Thr Arg Asn Asp Pro Ala Ile Val Lys Arg Leu Thr Glu Gln Gly	
125 130 135	
atg act gttattaat actgca aaa ggaga gaa gaa cttaaa aat cgt ata	603
Met Thr Val Ile Asn Thr Ala Lys Gly Glu Glu Leu Lys Asn Arg Ile	
140 145 150	
aaa gct gtc aaa tatatt gaa tgttct gca aaa acagcgaa aat tta	651
Lys Ala Val Lys Tyr Ile Glu Cys Ser Ala Lys Thr Ser Glu Asn Leu	
155 160 165	
aag acca gttttc gat gaa gca gttaaa actgtg tta atg aataaa cca	699
Lys Thr Val Phe Asp Glu Ala Val Lys Thr Val Leu Met Asn Lys Pro	
170 175 180 185	
cag caa agg tcaggttgt gct ctttta taattcactt ttaaatta	744
Gln Gln Arg Ser Lys Cys Ala Leu Leu	
190	

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<210> 102
<211> 194
<212> PRT
<213> Entamoeba histolytica
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<400> 102
Met Ser Glu Lys Pro Thr Ser Ile Lys Leu Val Val Val Gly Asp Gly
1          5          10          15
Ala Val Gly Lys Thr Cys Leu Leu Ile Cys Tyr Thr Thr Asn Glu Phe
          20          25          30
Pro Lys Asp Tyr Ile Pro Thr Val Phe Asp Asn Tyr Val Val Ser Leu

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35 40 45
 Thr Ala Gly Thr Arg Gln Ile Gln Leu Ala Leu Trp Asp Thr Ala Gly
 50 55 60
 Gln Glu Glu Tyr Asp Gln Leu Arg Pro Leu Ser Tyr Ser Ser Ala Ser
 65 70 75 80
 Ile Phe Leu Ile Cys Phe Ser Val Thr Ser Ser Val Ser Tyr Asp Asn
 85 90 95
 Val Ile Thr Lys Trp His Pro Glu Val Ile His Phe Ala Pro Lys Val
 100 105 110
 Pro Ile Ile Leu Val Gly Thr Lys Leu Asp Thr Arg Asn Asp Pro Ala
 115 120 125
 Ile Val Lys Arg Leu Thr Glu Gln Gly Met Thr Val Ile Asn Thr Ala
 130 135 140
 Lys Gly Glu Glu Leu Lys Asn Arg Ile Lys Ala Val Lys Tyr Ile Glu
 145 150 155 160
 Cys Ser Ala Lys Thr Ser Glu Asn Leu Lys Thr Val Phe Asp Glu Ala
 165 170 175
 Val Lys Thr Val Leu Met Asn Lys Pro Gln Gln Arg Ser Lys Cys Ala
 180 185 190
 Leu Leu

<210> 103
 <211> 588
 <212> DNA
 <213> Caenorhabditis elegans

<220>
 <221> CDS
 <222> (1)..(588)

<400> 103
 atg caa gca atc aaa tgt gtc gtc gtt ggt gac gga gcc gtc ggt aag 48
 Met Gln Ala Ile Lys Cys Val Val Val Gly Asp Gly Ala Val Gly Lys
 1 5 10 15
 acg tgt ctc ctg cta tcg tac act aca aac gct ttt ccc gga gaa tat 96
 Thr Cys Leu Leu Leu Ser Tyr Thr Thr Asn Ala Phe Pro Gly Glu Tyr
 20 25 30
 att cta acg gta ttc gac acc tac tca aca aat gtg atg gtc gac gga 144
 Ile Leu Thr Val Phe Asp Thr Tyr Ser Thr Asn Val Met Val Asp Gly
 35 40 45
 agg cca ata aat ctc agc cta tgg gac aca gct gga cag gac gat tac 192
 Arg Pro Ile Asn Leu Ser Leu Trp Asp Thr Ala Gly Gln Asp Asp Tyr
 50 55 60
 gat caa ttc cgc cac ctg tca ttt cca caa aca gac gta ttc ctc gta 240
 Asp Gln Phe Arg His Leu Ser Phe Pro Gln Thr Asp Val Phe Leu Val
 65 70 75 80
 tgc ttt gca ctg aat aat cca gca agt ttt gag aat gtt cgt gca aaa 288
 Cys Phe Ala Leu Asn Asn Pro Ala Ser Phe Glu Asn Val Arg Ala Lys
 85 90 95
 tgg tat cca gaa gta tca cat cat tgc cca aat aca ccg att att ttg 336
 Trp Tyr Pro Glu Val Ser His His Cys Pro Asn Thr Pro Ile Ile Leu
 100 105 110
 gtt gga act aaa gct gat tta cgc gag gat cga gat act att gaa cgg 384
 Val Gly Thr Lys Ala Asp Leu Arg Glu Asp Arg Asp Thr Ile Glu Arg
 115 120 125
 ctc cgt gaa cgt cgg ctc caa cca gtg agc cac acc cag ggt tac gtg 432
 Leu Arg Glu Arg Arg Leu Gln Pro Val Ser His Thr Gln Gly Tyr Val
 130 135 140
 atg gca aag gaa atc aag gcg gtc aag tac ctg gaa tgc tcg gcg ctt 480
 Met Ala Lys Glu Ile Lys Ala Val Lys Tyr Leu Glu Cys Ser Ala Leu
 145 150 155 160
 acc caa att gga ttg aaa caa gtt ttc gat gag gca att cgt act ggg 528
 Thr Gln Ile Gly Leu Lys Gln Val Phe Asp Glu Ala Ile Arg Thr Gly
 165 170 175
 ctc acc ccg cca caa aca cca caa acg aga gcc aaa aag agc aat tgc 576
 Leu Thr Pro Pro Gln Thr Pro Gln Thr Arg Ala Lys Lys Ser Asn Cys
 180 185 190

acg gtg ctt taa
Thr Val Leu
195

<210> 104
<211> 195
<212> PRT
<213> Caenorhabditis elegans

<400> 104
Met Gln Ala Ile Lys Cys Val Val Val Gly Asp Gly Ala Val Gly Lys
1 5 10 15
Thr Cys Leu Leu Leu Ser Tyr Thr Thr Asn Ala Phe Pro Gly Glu Tyr
20 25 30
Ile Leu Thr Val Phe Asp Thr Tyr Ser Thr Asn Val Met Val Asp Gly
35 40 45
Arg Pro Ile Asn Leu Ser Leu Trp Asp Thr Ala Gly Gln Asp Asp Tyr
50 55 60
Asp Gln Phe Arg His Leu Ser Phe Pro Gln Thr Asp Val Phe Leu Val
65 70 75 80
Cys Phe Ala Leu Asn Asn Pro Ala Ser Phe Glu Asn Val Arg Ala Lys
85 90 95
Trp Tyr Pro Glu Val Ser His His Cys Pro Asn Thr Pro Ile Ile Leu
100 105 110
Val Gly Thr Lys Ala Asp Leu Arg Glu Asp Arg Asp Thr Ile Glu Arg
115 120 125
Leu Arg Glu Arg Arg Leu Gln Pro Val Ser His Thr Gln Gly Tyr Val
130 135 140
Met Ala Lys Glu Ile Lys Ala Val Lys Tyr Leu Glu Cys Ser Ala Leu
145 150 155 160
Thr Gln Ile Gly Leu Lys Gln Val Phe Asp Glu Ala Ile Arg Thr Gly
165 170 175
Leu Thr Pro Pro Gln Thr Pro Gln Thr Arg Ala Lys Lys Ser Asn Cys
180 185 190
Thr Val Leu
195

<210> 105
<211> 594
<212> DNA
<213> Zea mays (maize)

<220>
<221> CDS
<222> (1)..(594)

<400> 105
atg agc gcg tcc agg ttc ata aag tgc gtc acg gtc ggg gac ggc gcc 48
Met Ser Ala Ser Arg Phe Ile Lys Cys Val Thr Val Gly Asp Gly Ala
1 5 10 15
gtc ggc aag acc tgc atg ctc atc tcc tac acc tcc aac acc ttc ccc 96
Val Gly Lys Thr Cys Met Leu Ile Ser Tyr Thr Ser Asn Thr Phe Pro
20 25 30
acc gac tat gtt ccg aca gtg ttt gat aac ttc agt gcc aac gtt gtg 144
Thr Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val Val
35 40 45
gtt gat ggt aat act gtc aac ctc ggc ctc tgg gac act gca ggt caa 192
Val Asp Gly Asn Thr Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln
50 55 60
gag gat tac aac aga ctg aga cca ctg agc tat cgt gga gct gat gtt 240
Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp Val
65 70 75 80
ttt ctt ctg gct ttc tca ctg atc agt aag gcc agc tat gag aat gtt 288
Phe Leu Leu Ala Phe Ser Leu Ile Ser Lys Ala Ser Tyr Glu Asn Val
85 90 95
tcg aag aag tgg ata cct gaa ctg aag cat tat gca cct ggt gtg cca 336
Ser Lys Lys Trp Ile Pro Glu Leu Lys His Tyr Ala Pro Gly Val Pro

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100	105	110	
att att ctc gta ggg aca aag ctt gat ctt cga gac gac aag cag ttc			384
Ile Ile Leu Val Gly Thr Lys Leu Asp Leu Arg Asp Asp Lys Gln Phe			
115	120	125	
ttt gtg gac cat cct ggt gct gtc cct atc act act gct cag gga gag			432
Phe Val Asp His Pro Gly Ala Val Pro Ile Thr Thr Ala Gln Gly Glu			
130	135	140	
gag cta aga aag caa ata ggc gct cca tac tac atc gaa tgc agc tcg			480
Glu Leu Arg Lys Gln Ile Gly Ala Pro Tyr Tyr Ile Glu Cys Ser Ser			
145	150	155	160
aag acc caa cta aac gtg aag ggc gtc ttt gat gcg gcg ata aag gtt			528
Lys Thr Gln Leu Asn Val Lys Gly Val Phe Asp Ala Ala Ile Lys Val			
165	170	175	
gtg ctg cag ccg cct aag gcg aag aag aag aaa aag gtg cag agg ggg			576
Val Leu Gln Pro Pro Lys Ala Lys Lys Lys Lys Val Gln Arg Gly			
180	185	190	
gcg tgc tcc att ttg tga			594
Ala Cys Ser Ile Leu			
195			

<210> 106
 <211> 197
 <212> PRT
 <213> Zea mays (maize)

<400> 106
 Met Ser Ala Ser Arg Phe Ile Lys Cys Val Thr Val Gly Asp Gly Ala
 1 5 10 15
 Val Gly Lys Thr Cys Met Leu Ile Ser Tyr Thr Ser Asn Thr Phe Pro
 20 25 30
 Thr Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val Val
 35 40 45
 Val Asp Gly Asn Thr Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln
 50 55 60
 Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp Val
 65 70 75 80
 Phe Leu Leu Ala Phe Ser Leu Ile Ser Lys Ala Ser Tyr Glu Asn Val
 85 90 95
 Ser Lys Lys Trp Ile Pro Glu Leu Lys His Tyr Ala Pro Gly Val Pro
 100 105 110
 Ile Ile Leu Val Gly Thr Lys Leu Asp Leu Arg Asp Asp Lys Gln Phe
 115 120 125
 Phe Val Asp His Pro Gly Ala Val Pro Ile Thr Thr Ala Gln Gly Glu
 130 135 140
 Glu Leu Arg Lys Gln Ile Gly Ala Pro Tyr Tyr Ile Glu Cys Ser Ser
 145 150 155 160
 Lys Thr Gln Leu Asn Val Lys Gly Val Phe Asp Ala Ala Ile Lys Val
 165 170 175
 Val Leu Gln Pro Pro Lys Ala Lys Lys Lys Lys Val Gln Arg Gly
 180 185 190
 Ala Cys Ser Ile Leu
 195

<210> 107
 <211> 1058
 <212> DNA
 <213> Zea mays (maize)

<220>
 <221> CDS
 <222> (176)..(769)

<400> 107
 gaattcggca cgagagctct caagacggcc gacggccggc ttgcctacct gctcccatcc 60
 ttcccaggagg accgagaaag ataagaaagg cggtgggtcaa cttgtgtcct gaggtgcccg 120

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tagaagccca aggacaagaa acaaggagaa gagtagatct acatctactc caccg atg      178
                                     Met
                                     1
agc gcg tct cgg ttc atc aag tgc gtc acc gtg ggg gac ggt gcc gtc      226
Ser Ala Ser Arg Phe Ile Lys Cys Val Thr Val Gly Asp Gly Ala Val
      5      10      15
gga aag acc tgc atg ctc atc tcc tac aca tcc aac act ttc ccc act      274
Gly Lys Thr Cys Met Leu Ile Ser Tyr Thr Ser Asn Thr Phe Pro Thr
      20      25      30
gac tat gtt cca act gtg ttc gac aac ttc agt gcc aat gtt gtg gtt      322
Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val Val Val
      35      40      45
gac ggg agc act gtc aac ttg ggt ctg tgg gat aca gca gga caa gaa      370
Asp Gly Ser Thr Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln Glu
      50      55      60      65
gat tac aat aga ctg cgt ccg ttg agc tat cgt ggt gct gat gtt ttt      418
Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp Val Phe
      70      75      80
ctg ctc gcc ttt tct ctt atc agc aaa gca agc tat gag aat gtc tct      466
Leu Leu Ala Phe Ser Leu Ile Ser Lys Ala Ser Tyr Glu Asn Val Ser
      85      90      95
aag aag tgg gtt cct gaa tta agg cac tat gct cct ggc gtg ccc ata      514
Lys Lys Trp Val Pro Glu Leu Arg His Tyr Ala Pro Gly Val Pro Ile
      100      105      110
atc ctt gtt ggg aca aaa ctt gat ctg cgt gat gat aag cag ttt ttt      562
Ile Leu Val Gly Thr Lys Leu Asp Leu Arg Asp Asp Lys Gln Phe Phe
      115      120      125
gtt gat cac cct ggt gct gtt cca att tcc act gcc cag ggc gaa gag      610
Val Asp His Pro Gly Ala Val Pro Ile Ser Thr Ala Gln Gly Glu Glu
      130      135      140      145
ctg agg aag cta att ggt gct gcc gcc tac atc gaa tgc agt tca aaa      658
Leu Arg Lys Leu Ile Gly Ala Ala Ala Tyr Ile Glu Cys Ser Ser Lys
      150      155      160
atc cag cag aac ata aaa gca gtg ttt gac gca gca att aag gtg gtt      706
Ile Gln Gln Asn Ile Lys Ala Val Phe Asp Ala Ala Ile Lys Val Val
      165      170      175
ctc cag cca cca aag caa aag aag agg aag aag aag gtg cag aag gga      754
Leu Gln Pro Pro Lys Gln Lys Lys Arg Lys Lys Lys Val Gln Lys Gly
      180      185      190
tgc acc att ttg taactacaaa cggtagaggg caacagtctg gctgcggcgc      806
Cys Thr Ile Leu
      195
tgctgccaat gataaccatc gcctccttgc tgtataatat atcgccctgat catgccacca      866

gcatgcacaa gggagatggg ggttttagga tccttgtcct actgtgttgt gtagaccacc      926

gggtgtagtt gactgtatct ggttgtttgt atgtatggac aagacaaaac tagcactgca      986

gatggtatgg taaggcgtaa gcaaatacaa tatgacattg gtccagttcc aggaaaaaaaa      1046

aaaaaaaaaa aa      1058

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<210> 108

<211> 197

<212> PRT

<213> Zea mays (maize)

<400> 108

Met Ser Ala Ser Arg Phe Ile Lys Cys Val Thr Val Gly Asp Gly Ala

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1 5 10 15
 Val Gly Lys Thr Cys Met Leu Ile Ser Tyr Thr Ser Asn Thr Phe Pro
 20 25 30
 Thr Asp Tyr Val Pro Thr Val Phe Asn Phe Ser Ala Asn Val Val
 35 40 45
 Val Asp Gly Ser Thr Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln
 50 55 60
 Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp Val
 65 70 75 80
 Phe Leu Leu Ala Phe Ser Leu Ile Ser Lys Ala Ser Tyr Glu Asn Val
 85 90 95
 Ser Lys Lys Trp Val Pro Glu Leu Arg His Tyr Ala Pro Gly Val Pro
 100 105 110
 Ile Ile Leu Val Gly Thr Lys Leu Asp Leu Arg Asp Asp Lys Gln Phe
 115 120 125
 Phe Val Asp His Pro Gly Ala Val Pro Ile Ser Thr Ala Gln Gly Glu
 130 135 140
 Glu Leu Arg Lys Leu Ile Gly Ala Ala Ala Tyr Ile Glu Cys Ser Ser
 145 150 155 160
 Lys Ile Gln Gln Asn Ile Lys Ala Val Phe Asp Ala Ala Ile Lys Val
 165 170 175
 Val Leu Gln Pro Pro Lys Gln Lys Lys Arg Lys Lys Lys Val Gln Lys
 180 185 190
 Gly Cys Thr Ile Leu
 195

<210> 109
 <211> 1045
 <212> DNA
 <213> Zea mays (maize)

<220>
 <221> CDS
 <222> (45)..(707)

<400> 109
 gaattcggca cgagctggct cgtgcagcgg cggcagtgag agcg atg agc gcg gcg 56
 Met Ser Ala Ala
 1
 gca gcg gcg gcg gcg agc tgc gtc acc aag ttc atc aag tgc gtc acg 104
 Ala Ala Ala Ala Ala Ser Ser Val Thr Lys Phe Ile Lys Cys Val Thr
 5 10 15 20
 gtc ggc gat ggg gcc gtc ggg aag acc tgc atg ctc atc tgc tac acc 152
 Val Gly Asp Gly Ala Val Gly Lys Thr Cys Met Leu Ile Cys Tyr Thr
 25 30 35
 tgc aac aag ttc ccc acg gat tac atc ccc acc gta ttt gac aac ttc 200
 Cys Asn Lys Phe Pro Thr Asp Tyr Ile Pro Thr Val Phe Asp Asn Phe
 40 45 50
 agc gcc aat gtc tcc gtg ggt ggg agc atc gtc aac ttg ggc ctc tgg 248
 Ser Ala Asn Val Ser Val Gly Gly Ser Ile Val Asn Leu Gly Leu Trp
 55 60 65
 gac acg gca ggc cag gag gat tac agc agg ttg agg cct ctc agc tac 296
 Asp Thr Ala Gly Gln Glu Asp Tyr Ser Arg Leu Arg Pro Leu Ser Tyr
 70 75 80
 agg ggt gct gat gtg ttc atc ctc tcc ttc tcc ctg gtc agc agg gcg 344
 Arg Gly Ala Asp Val Phe Ile Leu Ser Phe Ser Leu Val Ser Arg Ala
 85 90 95 100
 agc tat gag aac gtc ctg aag aag tgg atg cca gag ctt cgc cga ttt 392
 Ser Tyr Glu Asn Val Leu Lys Lys Trp Met Pro Glu Leu Arg Arg Phe
 105 110 115
 tca cct act gtt cct gta gtt ctt gtt gga acc aaa cta gat ctc cgt 440
 Ser Pro Thr Val Pro Val Val Leu Val Gly Thr Lys Leu Asp Leu Arg
 120 125 130
 gaa gac aga tct tac ctt gct gac cat tct gct gct tcc atc atc tct 488
 Glu Asp Arg Ser Tyr Leu Ala Asp His Ser Ala Ala Ser Ile Ile Ser
 135 140 145
 act gaa cag gga gaa gag ctc agg aag cag ata ggt gct gtg gcg tac 536
 Thr Glu Gln Gly Glu Glu Leu Arg Lys Gln Ile Gly Ala Val Ala Tyr

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      150              155              160
ata gaa tgc agc tca aag aca cag agg aac gta aag gct gtg ttc gac      584
Ile Glu Cys Ser Ser Lys Thr Gln Arg Asn Val Lys Ala Val Phe Asp
165              170              175              180
act gca att aaa gta gtg ctg caa cca ccg agg aga aga gaa gtt acc      632
Thr Ala Ile Lys Val Val Leu Gln Pro Pro Arg Arg Arg Glu Val Thr
      185              190              195
agg aag aaa atg aag aca agt tcg aat cag tct ctg aga aga tac ctc      680
Arg Lys Lys Met Lys Thr Ser Ser Asn Gln Ser Leu Arg Arg Tyr Leu
      200              205              210
tgt gga agc gga tgt ttc aca tcg taaagcacag actcttctgc gactgttgta      734
Cys Gly Ser Gly Cys Phe Thr Ser
      215              220
ctggacttgc tagatgggtg cagctctatg aatgagtagt cccctccgca gccactggga      794

acttctgggtt ctctgctacc ttccgataga gtgctctttt gcgttcacca gctgagaaaa      854

atgaagcgag gttctagttt ataaattccc tacgaggtgt accttcttta gtatgaatgg      914

tgggctatatt agcagttcag caaagtgtga agtgaccctt ctatgcatgt tttgtttcca      974

aaaactgatg ttgctaaatg gctaataaat ggttatggtc gcaccggaag aaaaaaaaaa      1034

aaaaaaaaaa a      1045

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<210> 110

<211> 220

<212> PRT

<213> Zea mays (maize)

<400> 110

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Met Ser Ala Ala Ala Ala Ala Ala Ser Ser Val Thr Lys Phe Ile
1              5              10              15
Lys Cys Val Thr Val Gly Asp Gly Ala Val Gly Lys Thr Cys Met Leu
      20              25              30
Ile Cys Tyr Thr Cys Asn Lys Phe Pro Thr Asp Tyr Ile Pro Thr Val
      35              40              45
Phe Asp Asn Phe Ser Ala Asn Val Ser Val Gly Gly Ser Ile Val Asn
      50              55              60
Leu Gly Leu Trp Asp Thr Ala Gly Gln Glu Asp Tyr Ser Arg Leu Arg
      65              70              75              80
Pro Leu Ser Tyr Arg Gly Ala Asp Val Phe Ile Leu Ser Phe Ser Leu
      85              90              95
Val Ser Arg Ala Ser Tyr Glu Asn Val Leu Lys Lys Trp Met Pro Glu
      100              105              110
Leu Arg Arg Phe Ser Pro Thr Val Pro Val Val Leu Val Gly Thr Lys
      115              120              125
Leu Asp Leu Arg Glu Asp Arg Ser Tyr Leu Ala Asp His Ser Ala Ala
      130              135              140
Ser Ile Ile Ser Thr Glu Gln Gly Glu Glu Leu Arg Lys Gln Ile Gly
      145              150              155              160
Ala Val Ala Tyr Ile Glu Cys Ser Ser Lys Thr Gln Arg Asn Val Lys
      165              170              175
Ala Val Phe Asp Thr Ala Ile Lys Val Val Leu Gln Pro Pro Arg Arg
      180              185              190
Arg Glu Val Thr Arg Lys Lys Met Lys Thr Ser Ser Asn Gln Ser Leu
      195              200              205
Arg Arg Tyr Leu Cys Gly Ser Gly Cys Phe Thr Ser
      210              215              220

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<210> 111
 <211> 876
 <212> DNA
 <213> *Saccharomyces cerevisiae*

<220>
 <221> CDS
 <222> (1)..(876)

<400> 111
 atg aat aca cta tta ttt aag cga aaa ggt ggc aat tgt ggg aac gaa 48
 Met Asn Thr Leu Leu Phe Lys Arg Lys Gly Gly Asn Cys Gly Asn Glu
 1 5 10 15
 agt aac ata gtt tcg cag gga tcg ccc tca agt agc aat ctt cct gaa 96
 Ser Asn Ile Val Ser Gln Gly Ser Pro Ser Ser Ser Asn Leu Pro Glu
 20 25 30
 tca cct ggc act tta gat gaa aag aat ctt ccc aga ttg cct act cca 144
 Ser Pro Gly Thr Leu Asp Glu Lys Asn Leu Pro Arg Leu Pro Thr Pro
 35 40 45
 ttc gct aga agc ctt tct acc att cct agt tat gag cag atg aaa cgt 192
 Phe Ala Arg Ser Leu Ser Thr Ile Pro Ser Tyr Glu Gln Met Lys Arg
 50 55 60
 aca aac aaa ctg cca gat tat cac cta aag att gtt gtt gtg gga gat 240
 Thr Asn Lys Leu Pro Asp Tyr His Leu Lys Ile Val Val Val Gly Asp
 65 70 75 80
 ggc gct gta ggg aag acg tgc ctg ctg ata tct tat gtc caa gga aca 288
 Gly Ala Val Gly Lys Thr Cys Leu Leu Ile Ser Tyr Val Gln Gly Thr
 85 90 95
 ttt ccg act gat tat att cct act att ttc gaa aat tat gtc aca aac 336
 Phe Pro Thr Asp Tyr Ile Pro Thr Ile Phe Glu Asn Tyr Val Thr Asn
 100 105 110
 ata gaa gga ccc aac ggt caa att ata gaa ttg gca tta tgg gac act 384
 Ile Glu Gly Pro Asn Gly Gln Ile Ile Glu Leu Ala Leu Trp Asp Thr
 115 120 125
 gcc ggc caa gaa gag tat agt aga ctt aga ccg ctt tca tat acg aat 432
 Ala Gly Gln Glu Glu Tyr Ser Arg Leu Arg Pro Leu Ser Tyr Thr Asn
 130 135 140
 gca gat gtg ctg atg gtg tgc tat tct gtt ggt agt aag aca tcg ctt 480
 Ala Asp Val Leu Met Val Cys Tyr Ser Val Gly Ser Lys Thr Ser Leu
 145 150 155 160
 aaa aat gtg gaa gat ctc tgg ttc cca gag gtt aag cat ttt tgt cct 528
 Lys Asn Val Glu Asp Leu Trp Phe Pro Glu Val Lys His Phe Cys Pro
 165 170 175
 tcc act cca atc atg cta gtc ggc ctt aaa tca gat cta tat gaa gct 576
 Ser Thr Pro Ile Met Leu Val Gly Leu Lys Ser Asp Leu Tyr Glu Ala
 180 185 190
 gat aac ctt tca gat ctg gtg gaa cca agt tca gca gaa tcc ttg gcc 624
 Asp Asn Leu Ser Asp Leu Val Glu Pro Ser Ser Ala Glu Ser Leu Ala
 195 200 205
 aag cgt ctg ggg gca ttt gca cat att caa tgc tca gca cga ttg aaa 672
 Lys Arg Leu Gly Ala Phe Ala His Ile Gln Cys Ser Ala Arg Leu Lys
 210 215 220
 gaa aat atc gat gaa gta ttt gaa act gcc ata cac acg tta ctt tcc 720
 Glu Asn Ile Asp Glu Val Phe Glu Thr Ala Ile His Thr Leu Leu Ser
 225 230 235 240
 gat tca tta tat gct ccc aga gag cct aca cat aca atc aaa aat ccc 768
 Asp Ser Leu Tyr Ala Pro Arg Glu Pro Thr His Thr Ile Lys Asn Pro
 245 250 255
 ttt aaa aga aat acc acc aga tca gat atc gat tct tct act gga gat 816
 Phe Lys Arg Asn Thr Thr Arg Ser Asp Ile Asp Ser Ser Thr Gly Asp
 260 265 270
 acc agc gtc tct att tcc gga acg aaa aga tta aga aaa aac aag tgt 864
 Thr Ser Val Ser Ile Ser Gly Thr Lys Arg Leu Arg Lys Asn Lys Cys
 275 280 285
 att ata atg taa 876
 Ile Ile Met
 290

<210> 112
 <211> 291
 <212> PRT
 <213> *Saccharomyces cerevisiae*

<400> 112
 Met Asn Thr Leu Leu Phe Lys Arg Lys Gly Gly Asn Cys Gly Asn Glu
 1 5 10 15
 Ser Asn Ile Val Ser Gln Gly Ser Pro Ser Ser Ser Asn Leu Pro Glu
 20 25 30
 Ser Pro Gly Thr Leu Asp Glu Lys Asn Leu Pro Arg Leu Pro Thr Pro
 35 40 45
 Phe Ala Arg Ser Leu Ser Thr Ile Pro Ser Tyr Glu Gln Met Lys Arg
 50 55 60
 Thr Asn Lys Leu Pro Asp Tyr His Leu Lys Ile Val Val Val Gly Asp
 65 70 75 80
 Gly Ala Val Gly Lys Thr Cys Leu Leu Ile Ser Tyr Val Gln Gly Thr
 85 90 95
 Phe Pro Thr Asp Tyr Ile Pro Thr Ile Phe Glu Asn Tyr Val Thr Asn
 100 105 110
 Ile Glu Gly Pro Asn Gly Gln Ile Ile Glu Leu Ala Leu Trp Asp Thr
 115 120 125
 Ala Gly Gln Glu Glu Tyr Ser Arg Leu Arg Pro Leu Ser Tyr Thr Asn
 130 135 140
 Ala Asp Val Leu Met Val Cys Tyr Ser Val Gly Ser Lys Thr Ser Leu
 145 150 155 160
 Lys Asn Val Glu Asp Leu Trp Phe Pro Glu Val Lys His Phe Cys Pro
 165 170 175
 Ser Thr Pro Ile Met Leu Val Gly Leu Lys Ser Asp Leu Tyr Glu Ala
 180 185 190
 Asp Asn Leu Ser Asp Leu Val Glu Pro Ser Ser Ala Glu Ser Leu Ala
 195 200 205
 Lys Arg Leu Gly Ala Phe Ala His Ile Gln Cys Ser Ala Arg Leu Lys
 210 215 220
 Glu Asn Ile Asp Glu Val Phe Glu Thr Ala Ile His Thr Leu Leu Ser
 225 230 235 240
 Asp Ser Leu Tyr Ala Pro Arg Glu Pro Thr His Thr Ile Lys Asn Pro
 245 250 255
 Phe Lys Arg Asn Thr Thr Arg Ser Asp Ile Asp Ser Ser Thr Gly Asp
 260 265 270
 Thr Ser Val Ser Ile Ser Gly Thr Lys Arg Leu Arg Lys Asn Lys Cys
 275 280 285
 Ile Ile Met
 290

<210> 113
 <211> 696
 <212> DNA
 <213> *Saccharomyces cerevisiae*

<220>
 <221> CDS
 <222> (1)..(696)

<400> 113
 atg tca ttt cta tgt ggg tca gct tca acg tca aat aaa ccg atc gaa 48
 Met Ser Phe Leu Cys Gly Ser Ala Ser Thr Ser Asn Lys Pro Ile Glu
 1 5 10 15
 aga aag atc gtt att ttg ggc gac ggt gcc tgt ggt aaa act tcg ttg 96
 Arg Lys Ile Val Ile Leu Gly Asp Gly Ala Cys Gly Lys Thr Ser Leu
 20 25 30
 ctg aat gtt ttc acc aga ggt tat ttt ccc gaa gtt tat gag cct act 144
 Leu Asn Val Phe Thr Arg Gly Tyr Phe Pro Glu Val Tyr Glu Pro Thr
 35 40 45
 gtt ttt gaa aac tat atc cat gat att ttc gtt gac agt aaa cat atc 192
 Val Phe Glu Asn Tyr Ile His Asp Ile Phe Val Asp Ser Lys His Ile
 50 55 60

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acg cta tcg ttg tgg gat act gcg ggc caa gag gaa ttt gac agg tta	240
Thr Leu Ser Leu Trp Asp Thr Ala Gly Gln Glu Glu Phe Asp Arg Leu	
65 70 75 80	
cga tcc ttg tct tat tca gat acg caa tgt ata atg tta tgt ttc agt	288
Arg Ser Leu Ser Tyr Ser Asp Thr Gln Cys Ile Met Leu Cys Phe Ser	
85 90 95	
att gat tca cgc gat tct tta gaa aat gtc caa aat aaa tgg gtg ggt	336
Ile Asp Ser Arg Asp Ser Leu Glu Asn Val Gln Asn Lys Trp Val Gly	
100 105 110	
gaa atc act gat cat tgt gaa ggc gtc aag tta gtc tta gtt gca cta	384
Glu Ile Thr Asp His Cys Glu Gly Val Lys Leu Val Leu Val Ala Leu	
115 120 125	
aag tgt gac tta aga aac aat gaa aat gaa tct aac gca atc aca ccg	432
Lys Cys Asp Leu Arg Asn Asn Glu Asn Glu Ser Asn Ala Ile Thr Pro	
130 135 140	
aac aat atc caa cag gat aac agc gtt tct aac gac aac gga aat aac	480
Asn Asn Ile Gln Gln Asp Asn Ser Val Ser Asn Asp Asn Gly Asn Asn	
145 150 155 160	
ata aat agc acc tca aac ggc aaa aac ctg ata agt tat gaa gaa ggt	528
Ile Asn Ser Thr Ser Asn Gly Lys Asn Leu Ile Ser Tyr Glu Glu Gly	
165 170 175	
cta gct atg gct aaa aag atc ggt gcg cta cgt tat ttg gaa tgt agc	576
Leu Ala Met Ala Lys Lys Ile Gly Ala Leu Arg Tyr Leu Glu Cys Ser	
180 185 190	
gct aag ctg aat aaa ggt gtc aac gaa gct ttc aca gaa gcc gca aga	624
Ala Lys Leu Asn Lys Gly Val Asn Glu Ala Phe Thr Glu Ala Ala Arg	
195 200 205	
gtt gct tta acc gcg ggc cca gta gca acc gaa gtg aaa agt gac agt	672
Val Ala Leu Thr Ala Gly Pro Val Ala Thr Glu Val Lys Ser Asp Ser	
210 215 220	
gga tcc agc tgt acc att atg taa	696
Gly Ser Ser Cys Thr Ile Met	
225 230	

<210> 114

<211> 231

<212> PRT

<213> *Saccharomyces cerevisiae*

<400> 114

Met Ser Phe Leu Cys Gly Ser Ala Ser Thr Ser Asn Lys Pro Ile Glu	
1 5 10 15	
Arg Lys Ile Val Ile Leu Gly Asp Gly Ala Cys Gly Lys Thr Ser Leu	
20 25 30	
Leu Asn Val Phe Thr Arg Gly Tyr Phe Pro Glu Val Tyr Glu Pro Thr	
35 40 45	
Val Phe Glu Asn Tyr Ile His Asp Ile Phe Val Asp Ser Lys His Ile	
50 55 60	
Thr Leu Ser Leu Trp Asp Thr Ala Gly Gln Glu Glu Phe Asp Arg Leu	
65 70 75 80	
Arg Ser Leu Ser Tyr Ser Asp Thr Gln Cys Ile Met Leu Cys Phe Ser	
85 90 95	
Ile Asp Ser Arg Asp Ser Leu Glu Asn Val Gln Asn Lys Trp Val Gly	
100 105 110	
Glu Ile Thr Asp His Cys Glu Gly Val Lys Leu Val Leu Val Ala Leu	
115 120 125	
Lys Cys Asp Leu Arg Asn Asn Glu Asn Glu Ser Asn Ala Ile Thr Pro	
130 135 140	
Asn Asn Ile Gln Gln Asp Asn Ser Val Ser Asn Asp Asn Gly Asn Asn	
145 150 155 160	
Ile Asn Ser Thr Ser Asn Gly Lys Asn Leu Ile Ser Tyr Glu Glu Gly	
165 170 175	
Leu Ala Met Ala Lys Lys Ile Gly Ala Leu Arg Tyr Leu Glu Cys Ser	
180 185 190	
Ala Lys Leu Asn Lys Gly Val Asn Glu Ala Phe Thr Glu Ala Ala Arg	
195 200 205	
Val Ala Leu Thr Ala Gly Pro Val Ala Thr Glu Val Lys Ser Asp Ser	

210 215
Gly Ser Ser Cys Thr Ile Met
225 230

220

<210> 115
<211> 579
<212> DNA
<213> *Drosophila melanogaster*

<220>
<221> CDS
<222> (1) .. (579)

<400> 115
atg acg acg att cgc aag aaa ttg gta att gtc ggc gac ggt gcc tgc 48
Met Thr Thr Ile Arg Lys Lys Leu Val Ile Val Gly Asp Gly Ala Cys
1 5 10 15
ggt aaa act tgc ctt ctg att gtc ttc agc aaa gat cag ttc ccc gag 96
Gly Lys Thr Cys Leu Leu Ile Val Phe Ser Lys Asp Gln Phe Pro Glu
20 25 30
gtc tat gtg ccc acc gta ttc gag aat tat gtg gcc gac atc gag gtg 144
Val Tyr Val Pro Thr Val Phe Glu Asn Tyr Val Ala Asp Ile Glu Val
35 40 45
gat ggc aaa cag gtg gag ctg gcc ttg tgg gat acg gcc ggg cag gag 192
Asp Gly Lys Gln Val Glu Leu Ala Leu Trp Asp Thr Ala Gly Gln Glu
50 55 60
gac tac gac aga cta cga ccg ctg agc tat ccc gac act gac gtc ata 240
Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Asp Thr Asp Val Ile
65 70 75 80
ctg atg tgt ttc tca gtg gat tca ccc gat tcg cta gaa aat att cct 288
Leu Met Cys Phe Ser Val Asp Ser Pro Asp Ser Leu Glu Asn Ile Pro
85 90 95
gaa aaa tgg acc cca gag gtc aaa cac ttt tgt cca aat gtt cca atc 336
Glu Lys Trp Thr Pro Glu Val Lys His Phe Cys Pro Asn Val Pro Ile
100 105 110
att ttg gta gga aat aag aaa gat ttg cga aat gat ccc aac aca att 384
Ile Leu Val Gly Asn Lys Lys Asp Leu Arg Asn Asp Pro Asn Thr Ile
115 120 125
cgg gat cta gca aaa atg aag cag gag ccg gtg aag ccg cag gag ggt 432
Arg Asp Leu Ala Lys Met Lys Gln Glu Pro Val Lys Pro Gln Glu Gly
130 135 140
cgc gcc atg gcc gag aag att aat gcc ttt gcc tat ttg gag tgt tcg 480
Arg Ala Met Ala Glu Lys Ile Asn Ala Phe Ala Tyr Leu Glu Cys Ser
145 150 155 160
gct aag tcc aag gag ggt gtg cga gat gtt ttc gag acg gca act agg 528
Ala Lys Ser Lys Glu Gly Val Arg Asp Val Phe Glu Thr Ala Thr Arg
165 170 175
gcc gcg ctg caa gtc aaa aag agg aag acc aga tgc ctt ttg ctc 576
Ala Ala Leu Gln Val Lys Lys Arg Lys Lys Thr Arg Cys Leu Leu Leu
180 185 190
taa 579

<210> 116
<211> 192
<212> PRT
<213> *Drosophila melanogaster*

<400> 116
Met Thr Thr Ile Arg Lys Lys Leu Val Ile Val Gly Asp Gly Ala Cys
1 5 10 15
Gly Lys Thr Cys Leu Leu Ile Val Phe Ser Lys Asp Gln Phe Pro Glu
20 25 30
Val Tyr Val Pro Thr Val Phe Glu Asn Tyr Val Ala Asp Ile Glu Val
35 40 45
Asp Gly Lys Gln Val Glu Leu Ala Leu Trp Asp Thr Ala Gly Gln Glu

[illegible]

<210> 118
 <211> 192
 <212> PRT
 <213> *Drosophila melanogaster*

<400> 118
 Met Gln Ala Ile Lys Cys Val Val Val Gly Asp Gly Ala Val Gly Lys
 1 5 10 15
 Thr Cys Leu Leu Ile Ser Tyr Thr Thr Asn Ala Phe Pro Gly Glu Tyr
 20 25 30
 Ile Pro Thr Val Phe Asp Asn Tyr Ser Ala Asn Val Met Val Asp Ala
 35 40 45
 Lys Pro Ile Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln Glu Asp Tyr
 50 55 60
 Asp Arg Leu Arg Pro Leu Ser Tyr Pro Gln Thr Asp Val Phe Leu Ile
 65 70 75 80
 Cys Phe Ser Leu Val Asn Pro Ala Ser Phe Glu Asn Val Arg Ala Lys
 85 90 95
 Trp Tyr Pro Glu Val Arg His His Cys Pro Ser Thr Pro Ile Ile Leu
 100 105 110
 Val Gly Thr Lys Leu Asp Leu Arg Asp Asp Lys Asn Thr Ile Glu Lys
 115 120 125
 Leu Arg Asp Lys Lys Leu Ala Pro Ile Thr Tyr Pro Gln Gly Ser Gly
 130 135 140
 His Gly Lys Glu Ile Gly Ala Val Lys Tyr Leu Glu Cys Ser Ala Leu
 145 150 155 160
 Thr Gln Lys Gly Leu Lys Thr Val Phe Asp Glu Ala Ile Arg Ser Val
 165 170 175
 Leu Cys Pro Val Leu Gln Pro Lys Ser Lys Arg Lys Cys Ala Leu Leu
 180 185 190

<210> 119
 <211> 579
 <212> DNA
 <213> *Drosophila melanogaster*

<220>
 <221> CDS
 <222> (1)..(579)

<400> 119
 atg cag gcc atc aag tgt gtg gtt gtg ggc gac gga gcg gtg gga aag 48
 Met Gln Ala Ile Lys Cys Val Val Val Gly Asp Gly Ala Val Gly Lys
 1 5 10 15
 acc tgt ctg ctg atc agc tat acg acc aac gcc ttc ccc ggc gag tac 96
 Thr Cys Leu Leu Ile Ser Tyr Thr Thr Asn Ala Phe Pro Gly Glu Tyr
 20 25 30
 ata ccc acg gtg ttc gac aac tat tcg gcg aat gtg atg gtg gat gcc 144
 Ile Pro Thr Val Phe Asp Asn Tyr Ser Ala Asn Val Met Val Asp Ala
 35 40 45
 aag ccc atc aat ctg ggc ctc tgg gat acg gct gga cag gag gac tac 192
 Lys Pro Ile Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln Glu Asp Tyr
 50 55 60
 gat cgc ctg agg ccg cta tcc tat ccg caa acg gat gtc ttt ctc atc 240
 Asp Arg Leu Arg Pro Leu Ser Tyr Pro Gln Thr Asp Val Phe Leu Ile
 65 70 75 80
 tgt ttc tca ctg gtg aat ccg gca tcg ttt gag aat gtg cga gcc aaa 288
 Cys Phe Ser Leu Val Asn Pro Ala Ser Phe Glu Asn Val Arg Ala Lys
 85 90 95
 tgg ttt ccc gag gtg cgt cat cat tgc ccg agt gtg ccg ata atc ctg 336
 Trp Phe Pro Glu Val Arg His His Cys Pro Ser Val Pro Ile Ile Leu
 100 105 110
 gtc ggc acc aaa ctg gat ctg cgc gac gat aag cag acg atc gag aag 384
 Val Gly Thr Lys Leu Asp Leu Arg Asp Asp Lys Gln Thr Ile Glu Lys
 115 120 125
 ctg aag gac aag aag cta aca ccg atc acc tat ccc caa gga ctg gcg 432
 Leu Lys Asp Lys Lys Leu Thr Pro Ile Thr Tyr Pro Gln Gly Leu Ala

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130	135	140	
atg gcc aag gaa ata gct gcg gtc aag tat ctg gag tgc tcg gcc ctg			480
Met Ala Lys Glu Ile Ala Val Lys Tyr Leu Glu Cys Ser Ala Leu			
145	150	155	160
acc caa aag ggt ctg aag acg gtc ttc gac gag gcc ata cga tcc gtg			528
Thr Gln Lys Gly Leu Lys Thr Val Phe Asp Glu Ala Ile Arg Ser Val			
165	170	175	
cta tgt cct gtc gtt cga gga ccc aag cgg cac aag tgc gcc ctg ctc			576
Leu Cys Pro Val Val Arg Gly Pro Lys Arg His Lys Cys Ala Leu Leu			
180	185	190	
taa			579

<210> 120

<211> 192

<212> PRT

<213> *Drosophila melanogaster*

<400> 120

Met Gln Ala Ile Lys Cys Val Val Val Gly Asp Gly Ala Val Gly Lys	
1 5 10 15	
Thr Cys Leu Leu Ile Ser Tyr Thr Thr Asn Ala Phe Pro Gly Glu Tyr	
20 25 30	
Ile Pro Thr Val Phe Asp Asn Tyr Ser Ala Asn Val Met Val Asp Ala	
35 40 45	
Lys Pro Ile Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln Glu Asp Tyr	
50 55 60	
Asp Arg Leu Arg Pro Leu Ser Tyr Pro Gln Thr Asp Val Phe Leu Ile	
65 70 75 80	
Cys Phe Ser Leu Val Asn Pro Ala Ser Phe Glu Asn Val Arg Ala Lys	
85 90 95	
Trp Phe Pro Glu Val Arg His His Cys Pro Ser Val Pro Ile Ile Leu	
100 105 110	
Val Gly Thr Lys Leu Asp Leu Arg Asp Asp Lys Gln Thr Ile Glu Lys	
115 120 125	
Leu Lys Asp Lys Lys Leu Thr Pro Ile Thr Tyr Pro Gln Gly Leu Ala	
130 135 140	
Met Ala Lys Glu Ile Ala Ala Val Lys Tyr Leu Glu Cys Ser Ala Leu	
145 150 155 160	
Thr Gln Lys Gly Leu Lys Thr Val Phe Asp Glu Ala Ile Arg Ser Val	
165 170 175	
Leu Cys Pro Val Val Arg Gly Pro Lys Arg His Lys Cys Ala Leu Leu	
180 185 190	

<210> 121

<211> 913

<212> DNA

<213> *Gossypium hirsutum* (upland cotton)

<220>

<221> CDS

<222> (12)..(602)

<400> 121

gagaaaaaac a atg agc act gca aga ttt atc aag tgt gtc acg gtc ggt	50
Met Ser Thr Ala Arg Phe Ile Lys Cys Val Thr Val Gly	
1 5 10	
gat gga gct gtg ggg aaa act tgt atg ctc att tca tat acc agc aat	98
Asp Gly Ala Val Gly Lys Thr Cys Met Leu Ile Ser Tyr Thr Ser Asn	
15 20 25	
act ttc cca acg gat tat gtt cca aca gta ttt gat aac ttt agt gcc	146
Thr Phe Pro Thr Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala	
30 35 40 45	
aat gtg gtg gtg gat ggc agc aca gtg aac ctt ggc cta tgg gac act	194
Asn Val Val Val Asp Gly Ser Thr Val Asn Leu Gly Leu Trp Asp Thr	
50 55 60	

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gcc ggg caa gaa gat tat aat agg cta agg cca ctg agt tat aga gga 242
 Ala Gly Gln Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly
 65 70 75
 gct gat gtg ttt ttg ttg gcc ttt tct ctt ata agc aag gcc agt tat 290
 Ala Asp Val Phe Leu Leu Ala Phe Ser Leu Ile Ser Lys Ala Ser Tyr
 80 85 90
 gaa aac atc tac aaa aag tgg atc cca gag cta aga cat tat gct cat 338
 Glu Asn Ile Tyr Lys Lys Trp Ile Pro Glu Leu Arg His Tyr Ala His
 95 100 105
 aat gta cca gtt gtg ctt gtt gga acc aaa cta gat ttg cga gat gac 386
 Asn Val Pro Val Val Val Gly Thr Lys Leu Asp Leu Arg Asp Asp
 110 115 120 125
 aag cag ttc ctc att gat cac cct gga gca aca cca ata tca aca tct 434
 Lys Gln Phe Leu Ile Asp His Pro Gly Ala Thr Pro Ile Ser Thr Ser
 130 135 140
 cag gga gaa gaa cta aag aag atg ata gga gca gtt act tat ata gaa 482
 Gln Gly Glu Glu Leu Lys Lys Met Ile Gly Ala Val Thr Tyr Ile Glu
 145 150 155
 tgc agc tcc aaa acc caa cag aat gtg aag gct gtt ttc gat gct gca 530
 Cys Ser Ser Lys Thr Gln Gln Asn Val Lys Ala Val Phe Asp Ala Ala
 160 165 170
 ata aaa gta gct ttg agg cca cca aaa cca aag aga aag cct tgc aaa 578
 Ile Lys Val Ala Leu Arg Pro Pro Lys Pro Lys Arg Lys Pro Cys Lys
 175 180 185
 agg aga aca tgt gct ttc ctt tgaatattgg atcattatta cagtcaaaaa 629
 Arg Arg Thr Cys Ala Phe Leu
 190 195
 cagttaacaa aagctgttgc agataaacac tgaatctgct atagtttggt tttgggtttac 689

 atatgttcca cgtgaaacta tgaagcatct ctaagaaaac ccaaactatc atatcaaccc 749

 atcgatcaat gaatcgattt caattttcgc agtataagtt ccttttaatc ctttcttttt 809

 acttcatttt ataacgaatt ctatggataa tgttccctac aaacatgtca ttacaatggt 869

 taattataaa ttccattctt ctattttact aaaaaaaaaa aaaa 913

<210> 122

<211> 196

<212> PRT

<213> *Gossypium hirsutum* (upland cotton)

<400> 122

Met Ser Thr Ala Arg Phe Ile Lys Cys Val Thr Val Gly Asp Gly Ala
 1 5 10 15
 Val Gly Lys Thr Cys Met Leu Ile Ser Tyr Thr Ser Asn Thr Phe Pro
 20 25 30
 Thr Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val Val
 35 40 45
 Val Asp Gly Ser Thr Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln
 50 55 60
 Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp Val
 65 70 75 80
 Phe Leu Leu Ala Phe Ser Leu Ile Ser Lys Ala Ser Tyr Glu Asn Ile
 85 90 95
 Tyr Lys Lys Trp Ile Pro Glu Leu Arg His Tyr Ala His Asn Val Pro
 100 105 110
 Val Val Leu Val Gly Thr Lys Leu Asp Leu Arg Asp Asp Lys Gln Phe
 115 120 125
 Leu Ile Asp His Pro Gly Ala Thr Pro Ile Ser Thr Ser Gln Gly Glu
 130 135 140

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Glu Leu Lys Lys Met Ile Gly Ala Val Thr Tyr Ile Glu Cys Ser Ser
 145 150 155 160
 Lys Thr Gln Gln Asn Val Lys Ala Val Phe Asp Ala Ala Ile Lys Val
 165 170 175
 Ala Leu Arg Pro Pro Lys Pro Lys Arg Lys Pro Cys Lys Arg Arg Thr
 180 185 190
 Cys Ala Phe Leu
 195

<210> 123

<211> 1067

<212> DNA

<213> Arabidopsis thaliana (mouse-ear cress)

<220>

<221> CDS

<222> (314)..(907)

<400> 123

cttttctctc tctagttggt gttctctctc tctctcgcat cctccaattc atcgctctca 60

cgttcccttt tgtttattca tcttcttcc ttcttcacat ttctgatttt ctctatttgg 120

ggggtttggt tccacattat acatatctag gggtttgaga tgggtaattg aaagataatg 180

gtcgaagttt cggaggaatt ggcttcacat tgtgggtggt tctggcttcc tcagggttaa 240

atctgaggtt gatctctttt gttttttggt aaattgtgac atattttggc tcgaagaaga 300

agaagaagag gca atg agc gca tca agg ttc ata aag tgc gtc acc gtt 349
 Met Ser Ala Ser Arg Phe Ile Lys Cys Val Thr Val
 1 5 10

ggt gat gga gct gtt ggt aaa acc tgt ttg ctg att tct tat acc agc 397
 Gly Asp Gly Ala Val Gly Lys Thr Cys Leu Leu Ile Ser Tyr Thr Ser
 15 20 25

aac acc ttt ccc acg gat tat gtt ccg act gtt ttc gat aac ttt agt 445
 Asn Thr Phe Pro Thr Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser
 30 35 40

gca aat gtg gtt gtc aat ggg gcc acg gtg aat ctt gga ttg tgg gat 493
 Ala Asn Val Val Val Asn Gly Ala Thr Val Asn Leu Gly Leu Trp Asp
 45 50 55 60

act gca ggg caa gag gac tat aac agg tta aga cct ttg agt tac cgt 541
 Thr Ala Gly Gln Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg
 65 70 75

ggt gct gat gtt ttc att ctt gcc ttc tct ctc att agt aag gct agt 589
 Gly Ala Asp Val Phe Ile Leu Ala Phe Ser Leu Ile Ser Lys Ala Ser
 80 85 90

tat gag aat gtt tcc aag aag tgg att cca gag ttg aag cac tat gct 637
 Tyr Glu Asn Val Ser Lys Lys Trp Ile Pro Glu Leu Lys His Tyr Ala
 95 100 105

cct ggt gtc cca att gtc ctt gtt gga acc aaa cta gat ctt cga gat 685
 Pro Gly Val Pro Ile Val Leu Val Gly Thr Lys Leu Asp Leu Arg Asp
 110 115 120

gac aaa cag ttt ttc atc gac cat cct ggt gct gtc cct att acc act 733
 Asp Lys Gln Phe Phe Ile Asp His Pro Gly Ala Val Pro Ile Thr Thr
 125 130 135 140

gtt cag gga gag gag ctg aag aag cta att gga gcg cca gct tac atc 781
 Val Gln Gly Glu Leu Lys Lys Leu Ile Gly Ala Pro Ala Tyr Ile
 145 150 155

gag tgc agt tca aaa tca caa gag aac gtg aag ggc gtg ttt gat gca 829
 Glu Cys Ser Ser Lys Ser Gln Glu Asn Val Lys Gly Val Phe Asp Ala
 160 165 170

gcg atc aga gtg gtc ctt caa cct cca aag cag aag aaa aag aag aac 877

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Ala Ile Arg Val Val Leu Gln Pro Pro Lys Gln Lys Lys Lys Lys Asn
 175 180 185
 aaa gca caa aag gcc tgc tcc atc ttg taatagcact catggaagtc 924
 Lys Ala Gln Lys Ala Cys Ser Ile Leu
 190 195
 aagaagctct ttgagatgag gatgacaggg tggtttaaaa aagtatcgct ttttcatttt 984

 tgttggtggt ttccgttttc atttgtgatc tcttagttcc gtacaaaacg aattgtgagg 1044

 ttaattcaac ttctatttta act 1067

<210> 124
 <211> 197
 <212> PRT
 <213> Arabidopsis thaliana (mouse-ear cress)

<400> 124
 Met Ser Ala Ser Arg Phe Ile Lys Cys Val Thr Val Gly Asp Gly Ala
 1 5 10 15
 Val Gly Lys Thr Cys Leu Leu Ile Ser Tyr Thr Ser Asn Thr Phe Pro
 20 25 30
 Thr Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val Val
 35 40 45
 Val Asn Gly Ala Thr Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln
 50 55 60
 Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp Val
 65 70 75 80
 Phe Ile Leu Ala Phe Ser Leu Ile Ser Lys Ala Ser Tyr Glu Asn Val
 85 90 95
 Ser Lys Lys Trp Ile Pro Glu Leu Lys His Tyr Ala Pro Gly Val Pro
 100 105 110
 Ile Val Leu Val Gly Thr Lys Leu Asp Leu Arg Asp Asp Lys Gln Phe
 115 120 125
 Phe Ile Asp His Pro Gly Ala Val Pro Ile Thr Thr Val Gln Gly Glu
 130 135 140
 Glu Leu Lys Lys Leu Ile Gly Ala Pro Ala Tyr Ile Glu Cys Ser Ser
 145 150 155 160
 Lys Ser Gln Glu Asn Val Lys Gly Val Phe Asp Ala Ala Ile Arg Val
 165 170 175
 Val Leu Gln Pro Pro Lys Gln Lys Lys Lys Lys Asn Lys Ala Gln Lys
 180 185 190
 Ala Cys Ser Ile Leu
 195

<210> 125
 <211> 695
 <212> DNA
 <213> Arabidopsis thaliana (mouse-ear cress)

<220>
 <221> CDS
 <222> (1)..(594)

<400> 125
 atg agc gct tcg agg ttc ata aag tgt gtc acc gtt ggc gac gga gct 48
 Met Ser Ala Ser Arg Phe Ile Lys Cys Val Thr Val Gly Asp Gly Ala
 1 5 10 15
 gtt ggt aaa acc tgt ttg ctg att tct tac acc agc aac act ttt cct 96
 Val Gly Lys Thr Cys Leu Leu Ile Ser Tyr Thr Ser Asn Thr Phe Pro
 20 25 30
 acg gat tat gta ccg act gtt ttc gat aac ttt agc gca aat gtg gtt 144
 Thr Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val Val
 35 40 45

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gtt aat gga gcc act gtg aat ctt ggg cta tgg gat acc gca ggg cag 192
 Val Asn Gly Ala Thr Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln
 50 55 60
 gag gat tat aac aga tta aga cct ttg agt tac cgc ggt gct gat gtt 240
 Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp Val
 65 70 75 80
 ttc atc tta gca ttc tct ctt atc agt aag gct agt tat gag aat gtc 288
 Phe Ile Leu Ala Phe Ser Leu Ile Ser Lys Ala Ser Tyr Glu Asn Val
 85 90 95
 tcc aag aag tgg atc cca gag ctg aag cat tat gcc cct ggt gtc cct 336
 Ser Lys Lys Trp Ile Pro Glu Leu Lys His Tyr Ala Pro Gly Val Pro
 100 105 110
 ata gtt ctt gtt gga acc aaa cta gat ctt cgg gat gac aaa cag ttc 384
 Ile Val Leu Val Gly Thr Lys Leu Asp Leu Arg Asp Asp Lys Gln Phe
 115 120 125
 ttc att gac cac cct ggc gct gta cca att act act gct cag gga gag 432
 Phe Ile Asp His Pro Gly Ala Val Pro Ile Thr Thr Ala Gln Gly Glu
 130 135 140
 gaa ctg aag aaa cta att gga gct ccc gca tac atc gag tgc agt tca 480
 Glu Leu Lys Lys Leu Ile Gly Ala Pro Ala Tyr Ile Glu Cys Ser Ser
 145 150 155 160
 aaa aca caa gag aac gtg aaa gga gta ttt gat gca gcg atc cga gtg 528
 Lys Thr Gln Glu Asn Val Lys Gly Val Phe Asp Ala Ala Ile Arg Val
 165 170 175
 gtt ctt caa cct cca aag cag aag aaa aag aaa agc aaa gca caa aaa 576
 Val Leu Gln Pro Pro Lys Gln Lys Lys Lys Ser Lys Ala Gln Lys
 180 185 190
 gcc tgc tcc att ttg taattttctct acgtttctct tacgtatctc tctctgtctc 631
 Ala Cys Ser Ile Leu
 195
 tctgtctctt ccactcttct agtgaaggct taagaagaaa acacattggg cttaaaaatt 691

 gttc 695

<210> 126

<211> 197

<212> PRT

<213> Arabidopsis thaliana (mouse-ear cress)

<400> 126

Met Ser Ala Ser Arg Phe Ile Lys Cys Val Thr Val Gly Asp Gly Ala
 1 5 10 15
 Val Gly Lys Thr Cys Leu Leu Ile Ser Tyr Thr Ser Asn Thr Phe Pro
 20 25 30
 Thr Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val Val
 35 40 45
 Val Asn Gly Ala Thr Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln
 50 55 60
 Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp Val
 65 70 75 80
 Phe Ile Leu Ala Phe Ser Leu Ile Ser Lys Ala Ser Tyr Glu Asn Val
 85 90 95
 Ser Lys Lys Trp Ile Pro Glu Leu Lys His Tyr Ala Pro Gly Val Pro
 100 105 110
 Ile Val Leu Val Gly Thr Lys Leu Asp Leu Arg Asp Asp Lys Gln Phe
 115 120 125
 Phe Ile Asp His Pro Gly Ala Val Pro Ile Thr Thr Ala Gln Gly Glu
 130 135 140
 Glu Leu Lys Lys Leu Ile Gly Ala Pro Ala Tyr Ile Glu Cys Ser Ser
 145 150 155 160
 Lys Thr Gln Glu Asn Val Lys Gly Val Phe Asp Ala Ala Ile Arg Val
 165 170 175
 Val Leu Gln Pro Pro Lys Gln Lys Lys Lys Ser Lys Ala Gln Lys
 180 185 190

Ala Cys Ser Ile Leu
195

<210> 127

<211> 630

<212> DNA

<213> Arabidopsis thaliana (mouse-ear cress)

<220>

<221> CDS

<222> (1)..(630)

<400> 127

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atg agt gct tgc aag ttc ata aaa tgt gtt act gtt gga gat ggg gct      48
Met Ser Ala Ser Lys Phe Ile Lys Cys Val Thr Val Gly Asp Gly Ala
1          5          10          15
gtt ggg aag aca tgt atg ctt atc tgt tac act agc aac aag ttt cct      96
Val Gly Lys Thr Cys Met Leu Ile Cys Tyr Thr Ser Asn Lys Phe Pro
          20          25          30
act gat tat ata ccg act gtg ttc gac aat ttc agt gcc aat gta gct      144
Thr Asp Tyr Ile Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val Ala
          35          40          45
gtg gat gga caa atc gtt aat tta ggg cta tgg gac act gcc ggt caa      192
Val Asp Gly Gln Ile Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln
          50          55          60
gaa gat tac agt agg tta aga cca ttg agt tat aga gga gct gat atc      240
Glu Asp Tyr Ser Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp Ile
65          70          75          80
ttc gtc tta gcc ttt tgc ctt att agc aag gcg agt tac gaa aat gta      288
Phe Val Leu Ala Phe Ser Leu Ile Ser Lys Ala Ser Tyr Glu Asn Val
          85          90          95
ctc aag aag tgg atg cct gaa ctt cgt cgg ttt gcg cca aat gtt ccc      336
Leu Lys Lys Trp Met Pro Glu Leu Arg Arg Phe Ala Pro Asn Val Pro
          100          105          110
ata gtt ctt gtt ggt aca aag cta gat ctc cgg gat gac aag gga tac      384
Ile Val Leu Val Gly Thr Lys Leu Asp Leu Arg Asp Asp Lys Gly Tyr
          115          120          125
ctc gcg gat cac acc aat gtc att acc tct act cag gga gag gaa ttg      432
Leu Ala Asp His Thr Asn Val Ile Thr Ser Thr Gln Gly Glu Glu Leu
          130          135          140
agg aag caa att ggt gca gct gct tat att gag tgt agt tcc aag act      480
Arg Lys Lys Gln Ile Gly Ala Ala Ala Tyr Ile Glu Cys Ser Ser Lys Thr
145          150          155          160
caa caa aat gtg aaa gca gtg ttt gat aca gcg atc aag gtg gtt ctt      528
Gln Gln Asn Val Lys Ala Val Phe Asp Thr Ala Ile Lys Val Val Leu
          165          170          175
cag cct cca agg agg aaa gag gtc ccg agg agg agg aag aat cat aga      576
Gln Pro Pro Arg Arg Lys Glu Val Pro Arg Arg Arg Lys Asn His Arg
          180          185          190
aga tcc ggt tgc tcc att gcg agt att gtc tgt gga ggt tgc acc gct      624
Arg Ser Gly Cys Ser Ile Ala Ser Ile Val Cys Gly Gly Cys Thr Ala
          195          200          205
gct taa
Ala

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<210> 128

<211> 209

<212> PRT

<213> Arabidopsis thaliana (mouse-ear cress)

<400> 128

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Met Ser Ala Ser Lys Phe Ile Lys Cys Val Thr Val Gly Asp Gly Ala
1          5          10          15
Val Gly Lys Thr Cys Met Leu Ile Cys Tyr Thr Ser Asn Lys Phe Pro
          20          25          30
Thr Asp Tyr Ile Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val Ala

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35	40	45
Val Asp Gln Ile Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln		
50	55	60
Glu Asp Tyr Ser Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp Ile		
65	70	75
Phe Val Leu Ala Phe Ser Leu Ile Ser Lys Ala Ser Tyr Glu Asn Val		
85	90	95
Leu Lys Lys Trp Met Pro Glu Leu Arg Arg Phe Ala Pro Asn Val Pro		
100	105	110
Ile Val Leu Val Gly Thr Lys Leu Asp Leu Arg Asp Asp Lys Gly Tyr		
115	120	125
Leu Ala Asp His Thr Asn Val Ile Thr Ser Thr Gln Gly Glu Glu Leu		
130	135	140
Arg Lys Gln Ile Gly Ala Ala Tyr Ile Glu Cys Ser Ser Lys Thr		
145	150	155
Gln Gln Asn Val Lys Ala Val Phe Asp Thr Ala Ile Lys Val Val Leu		
165	170	175
Gln Pro Pro Arg Arg Lys Glu Val Pro Arg Arg Arg Lys Asn His Arg		
180	185	190
Arg Ser Gly Cys Ser Ile Ala Ser Ile Val Cys Gly Gly Cys Thr Ala		
195	200	205
Ala		

<210> 129
 <211> 588
 <212> DNA
 <213> Caenorhabditis elegans

<220>
 <221> CDS
 <222> (1)..(588)

<400> 129	
atg tct tca ccg tgc agg cag atc aaa tgt gta gtt gtt gga gac gga	48
Met Ser Ser Pro Ser Arg Gln Ile Lys Cys Val Val Val Gly Asp Gly	
1 5 10 15	
aca gtt gga aaa aca tgc atg tta ata tct tac aca act gac tct ttt	96
Thr Val Gly Lys Thr Cys Met Leu Ile Ser Tyr Thr Thr Asp Ser Phe	
20 25 30	
cca gtt cag tat gtg cct aca gta ttt gat aac tat tgc gca cag atg	144
Pro Val Gln Tyr Val Pro Thr Val Phe Asp Asn Tyr Ser Ala Gln Met	
35 40 45	
agt ctt gat ggg aac gtt gtg aac tta gga ttg tgg gat act gct gga	192
Ser Leu Asp Gly Asn Val Val Asn Leu Gly Leu Trp Asp Thr Ala Gly	
50 55 60	
cag gag gat tat gat cgt tta cga cca ctt tcc tac cca cag acg gat	240
Gln Glu Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Gln Thr Asp	
65 70 75 80	
gtt ttc att ctc tgc ttc tct gtc gtc tgc ccc gta tgc ttt gac aat	288
Val Phe Ile Leu Cys Phe Ser Val Val Ser Pro Val Ser Phe Asp Asn	
85 90 95	
gtg gca agc aag tgg att ccg gaa ata cga cag cat tgt cca gat gcg	336
Val Ala Ser Lys Trp Ile Pro Glu Ile Arg Gln His Cys Pro Asp Ala	
100 105 110	
cct gtc att cta gtt ggt acc aaa ctc gat ttg cgc gac gag gcc gaa	384
Pro Val Ile Leu Val Gly Thr Lys Leu Asp Leu Arg Asp Glu Ala Glu	
115 120 125	
ccg atg cgt gct ctg cag gcc gaa gga aag tcc cca att tcc aaa acg	432
Pro Met Arg Ala Leu Gln Ala Glu Gly Lys Ser Pro Ile Ser Lys Thr	
130 135 140	
caa ggc atg aaa atg gct caa aaa att aaa gct gtc aag tat ttg gaa	480
Gln Gly Met Lys Met Ala Gln Lys Ile Lys Ala Val Lys Tyr Leu Glu	
145 150 155 160	
tgc tct gca ttg acg caa cag gga ctc aca cag gtg ttc gaa gac gcc	528
Cys Ser Ala Leu Thr Gln Gln Gly Leu Thr Gln Val Phe Glu Asp Ala	
165 170 175	
gta cgg tcc att ctt cat ccg aaa cca cag aaa aag aag aag tct tgc	576

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Val Arg Ser Ile Leu His Pro Lys Pro Gln Lys Lys Lys Lys Ser Cys
 180 185 190
 aat att atg taa
 Asn Ile Met
 195

588

<210> 130
 <211> 195
 <212> PRT
 <213> *Caenorhabditis elegans*

<400> 130
 Met Ser Ser Pro Ser Arg Gln Ile Lys Cys Val Val Val Gly Asp Gly
 1 5 10 15
 Thr Val Gly Lys Thr Cys Met Leu Ile Ser Tyr Thr Thr Asp Ser Phe
 20 25 30
 Pro Val Gln Tyr Val Pro Thr Val Phe Asp Asn Tyr Ser Ala Gln Met
 35 40 45
 Ser Leu Asp Gly Asn Val Val Asn Leu Gly Leu Trp Asp Thr Ala Gly
 50 55 60
 Gln Glu Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Gln Thr Asp
 65 70 75 80
 Val Phe Ile Leu Cys Phe Ser Val Val Ser Pro Val Ser Phe Asp Asn
 85 90 95
 Val Ala Ser Lys Trp Ile Pro Glu Ile Arg Gln His Cys Pro Asp Ala
 100 105 110
 Pro Val Ile Leu Val Gly Thr Lys Leu Asp Leu Arg Asp Glu Ala Glu
 115 120 125
 Pro Met Arg Ala Leu Gln Ala Glu Gly Lys Ser Pro Ile Ser Lys Thr
 130 135 140
 Gln Gly Met Lys Met Ala Gln Lys Ile Lys Ala Val Lys Tyr Leu Glu
 145 150 155 160
 Cys Ser Ala Leu Thr Gln Gln Gly Leu Thr Gln Val Phe Glu Asp Ala
 165 170 175
 Val Arg Ser Ile Leu His Pro Lys Pro Gln Lys Lys Lys Lys Ser Cys
 180 185 190
 Asn Ile Met
 195

<210> 131
 <211> 843
 <212> DNA
 <213> *Arabidopsis thaliana* (mouse-ear cress)

<220>
 <221> CDS
 <222> (90)..(683)

<400> 131
 acgcgtcgag aaactccaat tccaaaggct aaatctttga gatctttttt tttataaatt 60

 tctctgaaat taataaactt tgaggggaa atg agc gct tcg agg ttc gta aag 113
 Met Ser Ala Ser Arg Phe Val Lys
 1 5
 tgc gtg acg gtt ggt gat gga gct gtc gga aaa act tgt ttg ttg att 161
 Cys Val Thr Val Gly Asp Gly Ala Val Gly Lys Thr Cys Leu Leu Ile
 10 15 20
 tct tac aca agc aac act ttc cct acg gat tat gtg cct acc gtt ttc 209
 Ser Tyr Thr Ser Asn Thr Phe Pro Thr Asp Tyr Val Pro Thr Val Phe
 25 30 35 40
 gat aat ttc agt gcc aat gtt gtg gtt aat gga agc act gtg aat ctt 257
 Asp Asn Phe Ser Ala Asn Val Val Val Asn Gly Ser Thr Val Asn Leu
 45 50 55
 gga ttg tgg gac act gca ggg caa gag gat tac aat aga tta aga cca 305
 Gly Leu Trp Asp Thr Ala Gly Gln Glu Asp Tyr Asn Arg Leu Arg Pro
 60 65 70

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ctg agt tac cgt gga gca gat gtt ttc att ttg gcc ttc tct ctt atc      353
Leu Ser Tyr Arg Gly Ala Asp Val Phe Ile Leu Ala Phe Ser Leu Ile
75                               80                               85
agt aaa gcc agt tat gaa aac gtc tcc aaa aag tgg atc ccg gag ttg      401
Ser Lys Ala Ser Tyr Glu Asn Val Ser Lys Lys Trp Ile Pro Glu Leu
90                               95                               100
aaa cat tac gcg cct ggt gtc ccc atc gtc ctt gtt gga aca aag ctt      449
Lys His Tyr Ala Pro Gly Val Pro Ile Val Leu Val Gly Thr Lys Leu
105                              110                              115
gat ctt cga gat gat aaa cag ttc ttt atc gac cat cct ggt gct gtt      497
Asp Leu Arg Asp Asp Lys Gln Phe Phe Ile Asp His Pro Gly Ala Val
125                              130                              135
ccg att act act gct cag gga gag gag ctg agg aag caa ata gga gca      545
Pro Ile Thr Thr Ala Gln Gly Glu Glu Leu Arg Lys Gln Ile Gly Ala
140                              145                              150
cct act tac atc gaa tgc agt tcc aaa act caa gag aat gtg aag gcg      593
Pro Thr Tyr Ile Glu Cys Ser Ser Lys Thr Gln Glu Asn Val Lys Ala
155                              160                              165
gtg ttt gac gca gcc atc cga gtg gtg ttg caa ccg cca aag cag aag      641
Val Phe Asp Ala Ala Ile Arg Val Val Leu Gln Pro Pro Lys Gln Lys
170                              175                              180
aag aag aag agc aaa gcg cag aag gca tgc tcc att cta tgatgattgg      690
Lys Lys Lys Ser Lys Ala Gln Lys Ala Cys Ser Ile Leu
185                              190                              195
aaatctctgt ttttatgtat ttgggttttg tatattaatc ttatatcaat gaatgaatta      750

atgtgttaat ggacagacac ccaagtttga ctggtccttt ttgttcttaa tattaatgga      810

gtttgtcgga aaaaaaaaaa aaaaaaaaaa aaa                                843

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<210> 132

<211> 197

<212> PRT

<213> Arabidopsis thaliana (mouse-ear cress)

<400> 132

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Met Ser Ala Ser Arg Phe Val Lys Cys Val Thr Val Gly Asp Gly Ala
1      5      10      15
Val Gly Lys Thr Cys Leu Leu Ile Ser Tyr Thr Ser Asn Thr Phe Pro
20      25      30
Thr Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val Val
35      40      45
Val Asn Gly Ser Thr Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln
50      55      60
Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp Val
65      70      75      80
Phe Ile Leu Ala Phe Ser Leu Ile Ser Lys Ala Ser Tyr Glu Asn Val
85      90      95
Ser Lys Lys Trp Ile Pro Glu Leu Lys His Tyr Ala Pro Gly Val Pro
100     105     110
Ile Val Leu Val Gly Thr Lys Leu Asp Leu Arg Asp Asp Lys Gln Phe
115     120     125
Phe Ile Asp His Pro Gly Ala Val Pro Ile Thr Thr Ala Gln Gly Glu
130     135     140
Glu Leu Arg Lys Gln Ile Gly Ala Pro Thr Tyr Ile Glu Cys Ser Ser
145     150     155     160
Lys Thr Gln Glu Asn Val Lys Ala Val Phe Asp Ala Ala Ile Arg Val
165     170     175
Val Leu Gln Pro Pro Lys Gln Lys Lys Lys Ser Lys Ala Gln Lys
180     185     190
Ala Cys Ser Ile Leu
195

```


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<400> 134

```

Met Ser Thr Ala Arg Phe Ile Lys Cys Val Thr Val Gly Asp Gly Ala
1          5          10          15
Val Gly Lys Thr Cys Met Leu Ile Ser Tyr Thr Ser Asn Thr Phe Pro
20          25          30
Thr Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val Val
35          40          45
Val Asp Gly Ser Thr Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln
50          55          60
Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp Val
65          70          75          80
Phe Leu Leu Ala Phe Ser Leu Ile Ser Lys Ala Ser Tyr Glu Asn Ile
85          90          95
His Lys Lys Trp Leu Pro Glu Leu Lys His Tyr Ala Pro Gly Ile Pro
100         105         110
Ile Val Leu Val Gly Thr Lys Leu Asp Leu Arg Asp Asp Lys Gln Phe
115         120         125
Leu Lys Asp His Pro Gly Ala Ala Ser Ile Thr Thr Ala Gln Gly Glu
130         135         140
Glu Leu Arg Lys Met Ile Gly Ala Val Arg Tyr Leu Glu Cys Ser Ser
145         150         155         160
Lys Thr Gln Gln Asn Val Lys Ala Val Phe Asp Thr Ala Ile Arg Val
165         170         175
Ala Leu Arg Pro Pro Lys Ala Lys Lys Lys Ile Lys Pro Leu Lys Thr
180         185         190
Lys Arg Ser Arg Ile Cys Phe Phe Leu
195         200

```

<210> 135

<211> 784

<212> DNA

<213> Arabidopsis thaliana (mouse-ear cress)

<220>

<221> CDS

<222> (1)..(591)

<400> 135

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atg agt gct tcg agg ttt ata aag tgt gtc acc gtc ggc gat ggt gcc      48
Met Ser Ala Ser Arg Phe Ile Lys Cys Val Thr Val Gly Asp Gly Ala
1          5          10          15
gtc gga aaa act tgt atg ctg att tct tac aca agc aac act ttc cct      96
Val Gly Lys Thr Cys Met Leu Ile Ser Tyr Thr Ser Asn Thr Phe Pro
20          25          30
acg gac tat gtt cca act gtt ttc gac aac ttc agt gct aat gtg gtt      144
Thr Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val Val
35          40          45
gta gat ggg aac acg gtg aat ctt gga ttg tgg gat aca gct ggt caa      192
Val Asp Gly Asn Thr Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln
50          55          60
gaa gac tat aac agg tta aga ccg ttg agt tac cgt ggt gcc gat gtc      240
Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp Val
65          70          75          80
ttc att ctt gca ttc tcg ctt att agc aaa gct agc tac gag aat gta      288
Phe Ile Leu Ala Phe Ser Leu Ile Ser Lys Ala Ser Tyr Glu Asn Val
85          90          95
gcc aag aag tgg att cct gag ctt agg cat tat gcc cct ggt gtt cct      336
Ala Lys Lys Trp Ile Pro Glu Leu Arg His Tyr Ala Pro Gly Val Pro
100         105         110
ata atc ctc gtt gga acg aaa ctc gat ctt cga gat gac aag caa ttc      384
Ile Ile Leu Val Gly Thr Lys Leu Asp Leu Arg Asp Asp Lys Gln Phe
115         120         125
ttc ata gac cat cct ggt gca gtg cct att act aca aac cag gga gag      432
Phe Ile Asp His Pro Gly Ala Val Pro Ile Thr Thr Asn Gln Gly Glu
130         135         140
gaa cta aag aaa ctg ata gga tca cca atc tac att gaa tgt agt tca      480
Glu Leu Lys Lys Leu Ile Gly Ser Pro Ile Tyr Ile Glu Cys Ser Ser
145         150         155         160

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aag act cag cag aat gtg aaa gca gtc ttt gac gca gcc ata aaa gtg 528
 Lys Thr Gln Gln Asn Val Lys Ala Val Phe Asp Ala Ala Ile Lys Val
 165 170 175
 gtg ctt cag cca ccg aaa cag aag aag aag aaa aag aac aag aac cgc 576
 Val Leu Gln Pro Pro Lys Gln Lys Lys Lys Lys Asn Lys Asn Arg
 180 185 190
 tgc gtg ttc ttg tgatcgaaca tctcttaaaa cgaaaaaagg tttaggtaac 628
 Cys Val Phe Leu
 195
 aaaagaagct gaaggaaaac gaacacctgc aacattgtat agttgttgaa tccggcttgt 688
 ttcggctcttt actcttcttt ttgctggtga atctaagtag tgaactgagg ccaagaggag 748
 gattctgggt aagagaaggg gatgtgttct tttctt 784

<210> 136

<211> 196

<212> PRT

<213> Arabidopsis thaliana (mouse-ear cress)

<400> 136

Met Ser Ala Ser Arg Phe Ile Lys Cys Val Thr Val Gly Asp Gly Ala
 1 5 10 15
 Val Gly Lys Thr Cys Met Leu Ile Ser Tyr Thr Ser Asn Thr Phe Pro
 20 25 30
 Thr Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val Val
 35 40 45
 Val Asp Gly Asn Thr Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln
 50 55 60
 Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp Val
 65 70 75 80
 Phe Ile Leu Ala Phe Ser Leu Ile Ser Lys Ala Ser Tyr Glu Asn Val
 85 90 95
 Ala Lys Lys Trp Ile Pro Glu Leu Arg His Tyr Ala Pro Gly Val Pro
 100 105 110
 Ile Ile Leu Val Gly Thr Lys Leu Asp Leu Arg Asp Asp Lys Gln Phe
 115 120 125
 Phe Ile Asp His Pro Gly Ala Val Pro Ile Thr Thr Asn Gln Gly Glu
 130 135 140
 Glu Leu Lys Lys Leu Ile Gly Ser Pro Ile Tyr Ile Glu Cys Ser Ser
 145 150 155 160
 Lys Thr Gln Gln Asn Val Lys Ala Val Phe Asp Ala Ala Ile Lys Val
 165 170 175
 Val Leu Gln Pro Pro Lys Gln Lys Lys Lys Lys Lys Asn Lys Asn Arg
 180 185 190
 Cys Val Phe Leu
 195

<210> 137

<211> 679

<212> DNA

<213> Arabidopsis thaliana (mouse-ear cress)

<220>

<221> CDS

<222> (1) .. (648)

<400> 137

atg gct tca agt gct tca aag ttc atc aag tgt gtg act gtt ggt gat 48
 Met Ala Ser Ser Ala Ser Lys Phe Ile Lys Cys Val Thr Val Gly Asp
 1 5 10 15
 ggt gct gtt ggt aaa acc tgt atg ctc atc tgc tac acc agc aat aaa 96
 Gly Ala Val Gly Lys Thr Cys Met Leu Ile Cys Tyr Thr Ser Asn Lys

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20	25	30	
ttc ccc act gac tac ata cca aca gtt ttt gac aac ttt agt gca aat			144
Phe Pro Thr Asp Tyr Ile Pro Thr Val Phe Asp Asn Phe Ser Ala Asn			
35	40	45	
gtt gtt gtt gaa ggc acc act gtc aat ttg ggg ctt tgg gac act gct			192
Val Val Val Glu Gly Thr Thr Val Asn Leu Gly Leu Trp Asp Thr Ala			
50	55	60	
ggg caa gaa gac tat aac aga tta agg cct tta agt tac agg gga gca			240
Gly Gln Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala			
65	70	75	80
gat gtt ttc gtc ttg tct ttc tca tta gtc agc cga gct agc tac gag			288
Asp Val Phe Val Leu Ser Phe Ser Leu Val Ser Arg Ala Ser Tyr Glu			
85	90	95	
aat gtt ttt aaa aag tgg atc cct gaa ctc caa cac ttt gct cca gga			336
Asn Val Phe Lys Lys Trp Ile Pro Glu Leu Gln His Phe Ala Pro Gly			
100	105	110	
gtt ccc ctt gtc ctt gtt ggt acc aaa tta gat ctt cgt gaa gat aag			384
Val Pro Leu Val Leu Val Gly Thr Lys Leu Asp Leu Arg Glu Asp Lys			
115	120	125	
cat tat ttg gct gat cat cct gga cta tcc cct gta act act gca cag			432
His Tyr Leu Ala Asp His Pro Gly Leu Ser Pro Val Thr Thr Ala Gln			
130	135	140	
gga gag gag ttg cgt aag cta att ggt gcg acg tat tac att gag tgt			480
Gly Glu Glu Leu Arg Lys Leu Ile Gly Ala Thr Tyr Tyr Ile Glu Cys			
145	150	155	160
agt tca aaa act caa cag aat gtg aaa gca gtt ttt gat tct gcg ata			528
Ser Ser Lys Thr Gln Gln Asn Val Lys Ala Val Phe Asp Ser Ala Ile			
165	170	175	
aag gaa gtg atc aaa cct ctg gtt aaa caa aag gag aag act aag aag			576
Lys Glu Val Ile Lys Pro Leu Val Lys Gln Lys Glu Lys Thr Lys Lys			
180	185	190	
aag aag aag caa aag tcg aat cac ggc tgt tta tca aat gtt ctg tgt			624
Lys Lys Lys Gln Lys Ser Asn His Gly Cys Leu Ser Asn Val Leu Cys			
195	200	205	
ggg agg ata gtg act cgg cat tgatgacgat gacc caactc agtctgatga			675
Gly Arg Ile Val Thr Arg His			
210	215		
tttt			679

<210> 138

<211> 215

<212> PRT

<213> Arabidopsis thaliana (mouse-ear cress)

<400> 138

Met Ala Ser Ser Ala Ser Lys Phe Ile Lys Cys Val Thr Val Gly Asp	
1	15
Gly Ala Val Gly Lys Thr Cys Met Leu Ile Cys Tyr Thr Ser Asn Lys	
20	25
Phe Pro Thr Asp Tyr Ile Pro Thr Val Phe Asp Asn Phe Ser Ala Asn	
35	40
Val Val Val Glu Gly Thr Thr Val Asn Leu Gly Leu Trp Asp Thr Ala	
50	55
Gly Gln Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala	
65	70
Asp Val Phe Val Leu Ser Phe Ser Leu Val Ser Arg Ala Ser Tyr Glu	
85	90
Asn Val Phe Lys Lys Trp Ile Pro Glu Leu Gln His Phe Ala Pro Gly	
100	105
Val Pro Leu Val Leu Val Gly Thr Lys Leu Asp Leu Arg Glu Asp Lys	
115	120
His Tyr Leu Ala Asp His Pro Gly Leu Ser Pro Val Thr Thr Ala Gln	
130	135
Gly Glu Glu Leu Arg Lys Leu Ile Gly Ala Thr Tyr Tyr Ile Glu Cys	
145	150
	155
	160

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Ser Ser Lys Thr Gln Gln Asn Val Lys Ala Val Phe Asp Ser Ala Ile
 165 170 175
 Lys Glu Val Ile Lys Pro Leu Val Lys Gln Lys Glu Lys Thr Lys Lys
 180 185 190
 Lys Lys Lys Gln Lys Ser Asn His Gly Cys Leu Ser Asn Val Leu Cys
 195 200 205
 Gly Arg Ile Val Thr Arg His
 210 215

<210> 139

<211> 630

<212> DNA

<213> *Saccharomyces cerevisiae*

<220>

<221> CDS

<222> (1) .. (630)

<400> 139

atg tca caa caa gtt ggt aac agt atc aga aga aag ctg gta atc gtt	48
Met Ser Gln Gln Val Gly Asn Ser Ile Arg Arg Lys Leu Val Ile Val	
1 5 10 15	
ggt gat ggt gcc tgt ggt aag aca tgt tta tta atc gtc ttt tcc aag	96
Gly Asp Gly Ala Cys Gly Lys Thr Cys Leu Leu Ile Val Phe Ser Lys	
20 25 30	
ggc caa ttt cca gaa gtc tac gta cca act gtc ttt gaa aac tat gta	144
Gly Gln Phe Pro Glu Val Tyr Val Pro Thr Val Phe Glu Asn Tyr Val	
35 40 45	
gca gat gtt gaa gtt gat ggg cgt cgt gta gag cta gcg cta tgg gat	192
Ala Asp Val Glu Val Asp Gly Arg Arg Val Glu Leu Ala Leu Trp Asp	
50 55 60	
acc gct ggt caa gaa gat tat gat aga cta aga cca ttg tca tac cca	240
Thr Ala Gly Gln Glu Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro	
65 70 75 80	
gac tcc aat gtc gta tta att tgt ttc tct atc gat ctt cca gat tct	288
Asp Ser Asn Val Val Leu Ile Cys Phe Ser Ile Asp Leu Pro Asp Ser	
85 90 95	
tta gag aat gta caa gaa aaa tgg att gcc gaa gta tta cat ttc tgt	336
Leu Glu Asn Val Gln Glu Lys Trp Ile Ala Glu Val Leu His Phe Cys	
100 105 110	
caa ggt gtg cca att att ctt gtt ggt tgt aaa gtg gat ttg aga aac	384
Gln Gly Val Pro Ile Ile Leu Val Gly Cys Lys Val Asp Leu Arg Asn	
115 120 125	
gac cca caa acc att gaa caa tta aga caa gaa ggt caa caa ccc gtt	432
Asp Pro Gln Thr Ile Glu Gln Leu Arg Gln Glu Gly Gln Gln Pro Val	
130 135 140	
aca tca cag gag gga caa tct gta gca gac cag att ggc gca acc gga	480
Thr Ser Gln Glu Gly Gln Ser Val Ala Asp Gln Ile Gly Ala Thr Gly	
145 150 155 160	
tac tac gaa tgt tcg gcc aag act ggt tat ggt gtc aga gaa gtg ttt	528
Tyr Tyr Glu Cys Ser Ala Lys Thr Gly Tyr Gly Val Arg Glu Val Phe	
165 170 175	
gag gcc gcc act aga gct tca ttg atg ggt aaa tct aaa acg aat ggt	576
Glu Ala Ala Thr Arg Ala Ser Leu Met Gly Lys Ser Lys Thr Asn Gly	
180 185 190	
aaa gct aag aag aac act act gaa aag aag aag aag aag tgt gtc ttg	624
Lys Ala Lys Lys Asn Thr Thr Glu Lys Lys Lys Lys Lys Cys Val Leu	
195 200 205	
tta tag	630
Leu	

<210> 140

<211> 209

<212> PRT

<213> *Saccharomyces cerevisiae*

111/291

<400> 140

Met Ser Gln Gln Val Gly Asn Ser Ile Arg Arg Lys Leu Val Ile Val
 1 5 10 15
 Gly Asp Gly Ala Cys Gly Lys Thr Cys Leu Leu Ile Val Phe Ser Lys
 20 25 30
 Gly Gln Phe Pro Glu Val Tyr Val Pro Thr Val Phe Glu Asn Tyr Val
 35 40 45
 Ala Asp Val Glu Val Asp Gly Arg Arg Val Glu Leu Ala Leu Trp Asp
 50 55 60
 Thr Ala Gly Gln Glu Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro
 65 70 75 80
 Asp Ser Asn Val Val Leu Ile Cys Phe Ser Ile Asp Leu Pro Asp Ser
 85 90 95
 Leu Glu Asn Val Gln Glu Lys Trp Ile Ala Glu Val Leu His Phe Cys
 100 105 110
 Gln Gly Val Pro Ile Ile Leu Val Gly Cys Lys Val Asp Leu Arg Asn
 115 120 125
 Asp Pro Gln Thr Ile Glu Gln Leu Arg Gln Glu Gly Gln Gln Pro Val
 130 135 140
 Thr Ser Gln Glu Gly Gln Ser Val Ala Asp Gln Ile Gly Ala Thr Gly
 145 150 155 160
 Tyr Tyr Glu Cys Ser Ala Lys Thr Gly Tyr Gly Val Arg Glu Val Phe
 165 170 175
 Glu Ala Ala Thr Arg Ala Ser Leu Met Gly Lys Ser Lys Thr Asn Gly
 180 185 190
 Lys Ala Lys Lys Asn Thr Thr Glu Lys Lys Lys Lys Lys Cys Val Leu
 195 200 205
 Leu

<210> 141

<211> 987

<212> DNA

<213> *Aplysia californica* (California sea hare)

<220>

<221> CDS

<222> (14)..(592)

<400> 141

ccaagtgcc acc atg gca gcg ata cga aag aag ctt gtt ata gtc gga 49
 Met Ala Ala Ile Arg Lys Lys Leu Val Ile Val Gly
 1 5 10
 gat ggt gcg tgt ggt aaa aca tgt cta ctt att gtc ttc agc aaa gac 97
 Asp Gly Ala Cys Gly Lys Thr Cys Leu Leu Ile Val Phe Ser Lys Asp
 15 20 25
 cag ttc cct gaa gtt tac gtg cca aca gtt ttt gaa aat tat gta gca 145
 Gln Phe Pro Glu Val Tyr Val Pro Thr Val Phe Glu Asn Tyr Val Ala
 30 35 40
 gac att gaa gtt gat ggc aaa cag gtt gag cta gct ctg tgg gac aca 193
 Asp Ile Glu Val Asp Gly Lys Gln Val Glu Leu Ala Leu Trp Asp Thr
 45 50 55 60
 gcg gga caa gag gac tat gac aga ctg agg ccg ctg tct tac cct gac 241
 Ala Gly Gln Glu Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Asp
 65 70 75
 aca gat gtc atc ctc atg tgt ttc tct ata gac agt cca gac agt ctg 289
 Thr Asp Val Ile Leu Met Cys Phe Ser Ile Asp Ser Pro Asp Ser Leu
 80 85 90
 gag aac ata ccg gag aag tgg acg cct gag gtt cgt cac ttt tgt cca 337
 Glu Asn Ile Pro Glu Lys Trp Thr Pro Glu Val Arg His Phe Cys Pro
 95 100 105
 aat gtt cct ata ata ctt gtg ggt aac aaa aag gat ctt cgc aac gat 385
 Asn Val Pro Ile Ile Leu Val Gly Asn Lys Lys Asp Leu Arg Asn Asp
 110 115 120
 gaa agt acc aaa cgt gag ctc atg aaa atg aaa cag gaa cca gtg aga 433
 Glu Ser Thr Lys Arg Glu Leu Met Lys Met Lys Gln Glu Pro Val Arg
 125 130 135 140
 cca gag gat ggg cgc gcc atg gct gag aaa atc aac gcc tac tct tat 481

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Pro Glu Asp Gly Arg Ala Met Ala Glu Lys Ile Asn Ala Tyr Ser Tyr
 145 150 155
 ctt gag tgc tct gct aaa acc aag gag ggc gtg agg gat gtg ttt gag 529
 Leu Glu Cys Ser Ala Lys Thr Lys Glu Gly Val Arg Asp Val Phe Glu
 160 165 170
 aca gct acc aga gct gcg ctg caa gtg aaa aag aag aag ggt gga 577
 Thr Ala Thr Arg Ala Ala Leu Gln Val Lys Lys Lys Lys Lys Gly Gly
 175 180 185
 tgt gtt gta ttg tgaataagtc gctgttttct tcaattcccc acaacagggc 629
 Cys Val Val Leu
 190
 tgggtgaaagg aggactgcat gaaattttgt cttttgaaga tattcctttt aaaattattt 689
 tttttaaaat accaattttc aacttaagat tgttcaatta taattagtgc aaaaagacgg 749
 atgcttcccg actgaaacac aagaaaggcc atatcagagt ggcatatgat cacagtcata 809
 ttttgtggct tgtgtgattg catatatatt taagaacaaa tataagcgtc aactatctat 869
 ggctggagaa tgaggtaatg gaaatgtttt atttgagtaa attcctcatc tgcaaaaagt 929
 ttgtactaca gttgagtaaa atttcaagca ttgtctcctt tacaaattgt nngccccc 987

<210> 142

<211> 192

<212> PRT

<213> *Aplysia californica* (California sea hare)

<400> 142

Met Ala Ala Ile Arg Lys Lys Leu Val Ile Val Gly Asp Gly Ala Cys
 1 5 10 15
 Gly Lys Thr Cys Leu Leu Ile Val Phe Ser Lys Asp Gln Phe Pro Glu
 20 25 30
 Val Tyr Val Pro Thr Val Phe Glu Asn Tyr Val Ala Asp Ile Glu Val
 35 40 45
 Asp Gly Lys Gln Val Glu Leu Ala Leu Trp Asp Thr Ala Gly Gln Glu
 50 55 60
 Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Asp Thr Asp Val Ile
 65 70 75 80
 Leu Met Cys Phe Ser Ile Asp Ser Pro Asp Ser Leu Glu Asn Ile Pro
 85 90 95
 Glu Lys Trp Thr Pro Glu Val Arg His Phe Cys Pro Asn Val Pro Ile
 100 105 110
 Ile Leu Val Gly Asn Lys Lys Asp Leu Arg Asn Asp Glu Ser Thr Lys
 115 120 125
 Arg Glu Leu Met Lys Met Lys Gln Glu Pro Val Arg Pro Glu Asp Gly
 130 135 140
 Arg Ala Met Ala Glu Lys Ile Asn Ala Tyr Ser Tyr Leu Glu Cys Ser
 145 150 155 160
 Ala Lys Thr Lys Glu Gly Val Arg Asp Val Phe Glu Thr Ala Thr Arg
 165 170 175
 Ala Ala Leu Gln Val Lys Lys Lys Lys Lys Gly Gly Cys Val Val Leu
 180 185 190

<210> 143

<211> 579

<212> DNA

<213> *Homo sapiens* (man)

<220>

<221> CDS

<222> (1)...(579)

<400> 143

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atg cag gcc atc aag tgt gtg gtg gtg gga gac gga gct gta ggt aaa      48
Met Gln Ala Ile Lys Cys Val Val Val Gly Asp Gly Ala Val Gly Lys
1      5      10      15
act tgc cta ctg atc agt tac aca acc aat gca ttt cct gga gaa tat      96
Thr Cys Leu Leu Ile Ser Tyr Thr Thr Asn Ala Phe Pro Gly Glu Tyr
20      25      30
atc cct act gtc ttt gac aat tat tct gcc aat gtt atg gta gat gga      144
Ile Pro Thr Val Phe Asp Asn Tyr Ser Ala Asn Val Met Val Asp Gly
35      40      45
aaa ccg gtg aat ctg ggc tta tgg gat aca gct gga caa gaa gat tat      192
Lys Pro Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln Glu Asp Tyr
50      55      60
gac aga tta cgc ccc cta tcc tat ccg caa aca gat gtg ttc tta att      240
Asp Arg Leu Arg Pro Leu Ser Tyr Pro Gln Thr Asp Val Phe Leu Ile
65      70      75      80
tgc ttt tcc ctt gtg agt cct gca tca ttt gaa aat gtc cgt gca aag      288
Cys Phe Ser Leu Val Ser Pro Ala Ser Phe Glu Asn Val Arg Ala Lys
85      90      95
tgg tat cct gag gtg cgg cac cac tgt ccc aac act ccc atc atc cta      336
Trp Tyr Pro Glu Val Arg His His Cys Pro Asn Thr Pro Ile Ile Leu
100      105      110
gtg gga act aaa ctt gat ctt agg gat gat aaa gac acg atc gag aaa      384
Val Gly Thr Lys Leu Asp Leu Arg Asp Asp Lys Asp Thr Ile Glu Lys
115      120      125
ctg aag gag aag aag ctg act ccc atc acc tat ccg cag ggt cta gcc      432
Leu Lys Glu Lys Lys Leu Thr Pro Ile Thr Tyr Pro Gln Gly Leu Ala
130      135      140
atg gct aag gag att ggt gct gta aaa tac ctg gag tgc tgc gcg ctc      480
Met Ala Lys Glu Ile Gly Ala Val Lys Tyr Leu Glu Cys Ser Ala Leu
145      150      155      160
aca cag cga ggc ctc aag aca gtg ttt gac gaa gcg atc cga gca gtc      528
Thr Gln Arg Gly Leu Lys Thr Val Phe Asp Glu Ala Ile Arg Ala Val
165      170      175
ctc tgc ccg cct ccc gtg aag aag agg aag aga aaa tgc ctg ctg ttg      576
Leu Cys Pro Pro Pro Val Lys Lys Arg Lys Arg Lys Cys Leu Leu Leu
180      185      190
taa
579

```

<210> 144

<211> 192

<212> PRT

<213> Homo sapiens (man)

<400> 144

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Met Gln Ala Ile Lys Cys Val Val Val Gly Asp Gly Ala Val Gly Lys
1      5      10      15
Thr Cys Leu Leu Ile Ser Tyr Thr Thr Asn Ala Phe Pro Gly Glu Tyr
20      25      30
Ile Pro Thr Val Phe Asp Asn Tyr Ser Ala Asn Val Met Val Asp Gly
35      40      45
Lys Pro Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln Glu Asp Tyr
50      55      60
Asp Arg Leu Arg Pro Leu Ser Tyr Pro Gln Thr Asp Val Phe Leu Ile
65      70      75      80
Cys Phe Ser Leu Val Ser Pro Ala Ser Phe Glu Asn Val Arg Ala Lys
85      90      95
Trp Tyr Pro Glu Val Arg His His Cys Pro Asn Thr Pro Ile Ile Leu
100      105      110
Val Gly Thr Lys Leu Asp Leu Arg Asp Asp Lys Asp Thr Ile Glu Lys
115      120      125
Leu Lys Glu Lys Lys Leu Thr Pro Ile Thr Tyr Pro Gln Gly Leu Ala

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130	135	140
Met Ala Lys Glu Ile Gly	Ala Val Lys Tyr Leu	Glu Cys Ser Ala Leu
145	150	155
Thr Gln Arg Gly Leu	Lys Thr Val Phe Asp	Glu Ala Ile Arg Ala Val
165	170	175
Leu Cys Pro Pro Val Lys Lys	Arg Lys Arg Lys Cys	Leu Leu Leu
180	185	190

<210> 145
 <211> 642
 <212> DNA
 <213> Homo sapiens (man)

<220>
 <221> CDS
 <222> (1)..(642)

<400> 145

atg ccc gga gcc ggc cgc agc agc atg gct cac ggg ccc ggc gcg ctg	48
Met Pro Gly Ala Gly Arg Ser Ser Met Ala His Gly Pro Gly Ala Leu	
1 5 10 15	
atg ctc aag tgc gtg gtc ggc gac ggg gcg gtg ggc aag acg tgc	96
Met Leu Lys Cys Val Val Val Gly Asp Gly Ala Val Gly Lys Thr Cys	
20 25 30	
cta ctc atg agc tat gcc aac gac gcc ttc ccg gag gag tac gtg ccc	144
Leu Leu Met Ser Tyr Ala Asn Asp Ala Phe Pro Glu Glu Tyr Val Pro	
35 40 45	
acc gtc ttc gac cac tac gca gtc agc gtc acc gtg ggg ggc aag cag	192
Thr Val Phe Asp His Tyr Ala Val Ser Val Thr Val Gly Gly Lys Gln	
50 55 60	
tac ctc cta gga ctc tat gac acg gcc gga cag gaa gac tat gac cgt	240
Tyr Leu Leu Gly Leu Tyr Asp Thr Ala Gly Gln Glu Asp Tyr Asp Arg	
65 70 75 80	
ctg agg cct tta tct tac cca atg acc gat gtc ttc ctt ata tgc ttc	288
Leu Arg Pro Leu Ser Tyr Pro Met Thr Asp Val Phe Leu Ile Cys Phe	
85 90 95	
tcg gtg gta aat cca gcc tca ttt caa aat gtg aaa gag gag tgg gta	336
Ser Val Val Asn Pro Ala Ser Phe Gln Asn Val Lys Glu Glu Trp Val	
100 105 110	
ccg gaa ctt aag gaa tac gca cca aat gta ccc ttt tta ata gga	384
Pro Glu Leu Lys Glu Tyr Ala Pro Asn Val Pro Phe Leu Leu Ile Gly	
115 120 125	
act cag att gat ctc cga gat gac ccc aaa act tta gca aga ctg aat	432
Thr Gln Ile Asp Leu Arg Asp Asp Pro Lys Thr Leu Ala Arg Leu Asn	
130 135 140	
gat atg aaa gaa aaa cct ata tgt gtg gaa caa gga cag aaa cta gca	480
Asp Met Lys Glu Lys Pro Ile Cys Val Glu Gln Gly Gln Lys Leu Ala	
145 150 155 160	
aaa gag ata gga gca tgc tgc tat gtg gaa tgt tca gct tta acc cag	528
Lys Glu Ile Gly Ala Cys Cys Tyr Val Glu Cys Ser Ala Leu Thr Gln	
165 170 175	
aag gga ttg aag act gtt ttt gat gag gct atc ata gcc att tta act	576
Lys Gly Leu Lys Thr Val Phe Asp Glu Ala Ile Ile Ala Ile Leu Thr	
180 185 190	
cca aag aaa cac act gta aaa aaa aga ata gga tca aga tgt ata aac	624
Pro Lys Lys His Thr Val Lys Lys Arg Ile Gly Ser Arg Cys Ile Asn	
195 200 205	
tgt tgt tta att acg tga	642
Cys Cys Leu Ile Thr	
210	

<210> 146
 <211> 213
 <212> PRT
 <213> Homo sapiens (man)

<400> 146

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Met Pro Gly Ala Gly Arg Ser Ser Met Ala His Gly Pro Gly Ala Leu
 1 5 10 15
 Met Leu Lys Cys Val Val Val Gly Asp Gly Ala Val Gly Lys Thr Cys
 20 25 30
 Leu Leu Met Ser Tyr Ala Asn Asp Ala Phe Pro Glu Glu Tyr Val Pro
 35 40 45
 Thr Val Phe Asp His Tyr Ala Val Ser Val Thr Val Gly Gly Lys Gln
 50 55 60
 Tyr Leu Leu Gly Leu Tyr Asp Thr Ala Gly Gln Glu Asp Tyr Asp Arg
 65 70 75 80
 Leu Arg Pro Leu Ser Tyr Pro Met Thr Asp Val Phe Leu Ile Cys Phe
 85 90 95
 Ser Val Val Asn Pro Ala Ser Phe Gln Asn Val Lys Glu Glu Trp Val
 100 105 110
 Pro Glu Leu Lys Glu Tyr Ala Pro Asn Val Pro Phe Leu Leu Ile Gly
 115 120 125
 Thr Gln Ile Asp Leu Arg Asp Asp Pro Lys Thr Leu Ala Arg Leu Asn
 130 135 140
 Asp Met Lys Glu Lys Pro Ile Cys Val Glu Gln Gly Gln Lys Leu Ala
 145 150 155 160
 Lys Glu Ile Gly Ala Cys Cys Tyr Val Glu Cys Ser Ala Leu Thr Gln
 165 170 175
 Lys Gly Leu Lys Thr Val Phe Asp Glu Ala Ile Ile Ala Ile Leu Thr
 180 185 190
 Pro Lys Lys His Thr Val Lys Lys Arg Ile Gly Ser Arg Cys Ile Asn
 195 200 205
 Cys Cys Leu Ile Thr
 210

<210> 147

<211> 582

<212> DNA

<213> Homo sapiens (man)

<220>

<221> CDS

<222> (1)..(582)

<400> 147

atg gct gca atc cga aag aag ctg gtg atc gtt ggg gat ggt gcc tgt	48
Met Ala Ala Ile Arg Lys Lys Leu Val Ile Val Gly Asp Gly Ala Cys	
1 5 10 15	
ggg aag acc tgc ctc ctc atc gtc ttc agc aag gat cag ttt ccg gag	96
Gly Lys Thr Cys Leu Leu Ile Val Phe Ser Lys Asp Gln Phe Pro Glu	
20 25 30	
gtc tac gtc cct act gtc ttt gag aac tat att gcg gac att gag gtg	144
Val Tyr Val Pro Thr Val Phe Glu Asn Tyr Ile Ala Asp Ile Glu Val	
35 40 45	
gac ggc aag cag gtg gag ctg gct ctg tgg gac aca gca ggg cag gaa	192
Asp Gly Lys Gln Val Glu Leu Ala Leu Trp Asp Thr Ala Gly Gln Glu	
50 55 60	
gac tat gat cga ctg cgg cct ctc tcc tac ccg gac act gat gtc atc	240
Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Asp Thr Asp Val Ile	
65 70 75 80	
ctc atg tgc ttc tcc atc gac agc cct gac agc ctg gaa aac att cct	288
Leu Met Cys Phe Ser Ile Asp Ser Pro Asp Ser Leu Glu Asn Ile Pro	
85 90 95	
gag aag tgg acc cca gag gtg aag cac ttc tgc ccc aac gtg ccc atc	336
Glu Lys Trp Thr Pro Glu Val Lys His Phe Cys Pro Asn Val Pro Ile	
100 105 110	
atc ctg gtg ggg aat aag aag gac ctg agg caa gac gag cac acc agg	384
Ile Leu Val Gly Asn Lys Lys Asp Leu Arg Gln Asp Glu His Thr Arg	
115 120 125	
aga gag ctg gcc aag atg aag gag gag ccc gtt cgg tct gag gaa ggc	432
Arg Glu Leu Ala Lys Met Lys Gln Glu Pro Val Arg Ser Glu Glu Gly	
130 135 140	
cgg gac atg gcg aac cgg atc agt gcc ttt ggc tac ctt gag tgc tca	480
Arg Asp Met Ala Asn Arg Ile Ser Ala Phe Gly Tyr Leu Glu Cys Ser	

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145	150	155	160	
gcc aag acc aag gag gga gtg cgg gag gtg ttt gag atg gcc act cgg				528
Ala Lys Thr Lys Glu Gly Val Arg Glu Val Phe Glu Met Ala Thr Arg				
	165	170	175	
gct ggc ctc cag gtc cgc aag aac aag cgt cgg agg ggc tgt ccc att				576
Ala Gly Leu Gln Val Arg Lys Asn Lys Arg Arg Arg Gly Cys Pro Ile				
	180	185	190	
ctc tga				582
Leu				

<210> 148
 <211> 193
 <212> PRT
 <213> Homo sapiens (man)

<400> 148

Met Ala Ala Ile Arg Lys Lys Leu Val Ile Val Gly Asp Gly Ala Cys	
1 5 10 15	
Gly Lys Thr Cys Leu Leu Ile Val Phe Ser Lys Asp Gln Phe Pro Glu	
20 25 30	
Val Tyr Val Pro Thr Val Phe Glu Asn Tyr Ile Ala Asp Ile Glu Val	
35 40 45	
Asp Gly Lys Gln Val Glu Leu Ala Leu Trp Asp Thr Ala Gly Gln Glu	
50 55 60	
Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Asp Thr Asp Val Ile	
65 70 75 80	
Leu Met Cys Phe Ser Ile Asp Ser Pro Asp Ser Leu Glu Asn Ile Pro	
85 90 95	
Glu Lys Trp Thr Pro Glu Val Lys His Phe Cys Pro Asn Val Pro Ile	
100 105 110	
Ile Leu Val Gly Asn Lys Lys Asp Leu Arg Gln Asp Glu His Thr Arg	
115 120 125	
Arg Glu Leu Ala Lys Met Lys Gln Glu Pro Val Arg Ser Glu Glu Gly	
130 135 140	
Arg Asp Met Ala Asn Arg Ile Ser Ala Phe Gly Tyr Leu Glu Cys Ser	
145 150 155 160	
Ala Lys Thr Lys Glu Gly Val Arg Glu Val Phe Glu Met Ala Thr Arg	
165 170 175	
Ala Gly Leu Gln Val Arg Lys Asn Lys Arg Arg Arg Gly Cys Pro Ile	
180 185 190	
Leu	

<210> 149
 <211> 576
 <212> DNA
 <213> Homo sapiens (man)

<220>
 <221> CDS
 <222> (1)..(576)

<400> 149

atg cag agc atc aag tgc gtg gtg gtg ggt gat ggg gct gtg ggc aag	48
Met Gln Ser Ile Lys Cys Val Val Val Gly Asp Gly Ala Val Gly Lys	
1 5 10 15	
acg tgc ctg ctc atc tgc tac aca act aac gct ttc ccc aaa gag tac	96
Thr Cys Leu Leu Ile Cys Tyr Thr Thr Asn Ala Phe Pro Lys Glu Tyr	
20 25 30	
atc ccc acc gtg ttc gac aat tac agc gcg cag agc gca gtt gac ggg	144
Ile Pro Thr Val Phe Asp Asn Tyr Ser Ala Gln Ser Ala Val Asp Gly	
35 40 45	
cgc aca gtg aac ctg aac ctg tgg gac act gcg ggc cag gag gag tat	192
Arg Thr Val Asn Leu Asn Leu Trp Asp Thr Ala Gly Gln Glu Glu Tyr	
50 55 60	
gac cgc ctc cgt aca ctc tcc tac cct cag acc aac gtt ttc gtc atc	240

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Asp	Arg	Leu	Arg	Thr	Leu	Ser	Tyr	Pro	Gln	Thr	Asn	Val	Phe	Val	Ile		
65					70					75					80		
tgt	ttc	tcc	att	gcc	agt	ccg	ccg	tcc	tat	gag	aac	gtg	cgg	cac	aag		288
Cys	Phe	Ser	Ile	Ala	Ser	Pro	Pro	Ser	Tyr	Glu	Asn	Val	Arg	His	Lys		
				85					90					95			
tgg	cat	cca	gag	gtg	tgc	cac	cac	tgc	cct	gat	gtg	ccc	atc	ctg	ctg		336
Trp	His	Pro	Glu	Val	Cys	His	His	Cys	Pro	Asp	Val	Pro	Ile	Leu	Leu		
			100					105					110				
gtg	ggc	acc	aag	aag	gac	ctg	aga	gcc	cag	cct	gac	acc	cta	cgg	cgc		384
Val	Gly	Thr	Lys	Lys	Asp	Leu	Arg	Ala	Gln	Pro	Asp	Thr	Leu	Arg	Arg		
			115				120					125					
ctc	aag	gag	cag	agc	cag	gcg	ccc	atc	aca	ccg	cag	cag	ggc	cag	gca		432
Leu	Lys	Glu	Gln	Ser	Gln	Ala	Pro	Ile	Thr	Pro	Gln	Gln	Gly	Gln	Ala		
			130				135					140					
ctc	gcg	aaa	cag	atc	cac	gct	gtg	cgc	tac	ctc	gaa	tgc	tca	gcc	ctg		480
Leu	Ala	Lys	Gln	Ile	His	Ala	Val	Arg	Tyr	Leu	Glu	Cys	Ser	Ala	Leu		
					150				155					160			
cāa	cag	gat	ggt	gtc	aag	gaa	gtg	ttc	gcc	gag	gct	gtc	cgg	gct	gtg		528
Gln	Gln	Asp	Gly	Val	Lys	Glu	Val	Phe	Ala	Glu	Ala	Val	Arg	Ala	Val		
					165				170				175				
ctc	aac	ccc	acg	ccg	atc	aag	cgt	ggg	cgg	tcc	tgc	atc	ctc	ttg			573
Leu	Asn	Pro	Thr	Pro	Ile	Lys	Arg	Gly	Arg	Ser	Cys	Ile	Leu	Leu			
				180				185					190				
tga																	576

<210> 150
 <211> 191
 <212> PRT
 <213> Homo sapiens (man)

<400> 150
 Met Gln Ser Ile Lys Cys Val Val Val Gly Asp Gly Ala Val Gly Lys
 1 5 10 15
 Thr Cys Leu Leu Ile Cys Tyr Thr Thr Asn Ala Phe Pro Lys Glu Tyr
 20 25 30
 Ile Pro Thr Val Phe Asp Asn Tyr Ser Ala Gln Ser Ala Val Asp Gly
 35 40 45
 Arg Thr Val Asn Leu Asn Leu Trp Asp Thr Ala Gly Gln Glu Glu Tyr
 50 55 60
 Asp Arg Leu Arg Thr Leu Ser Tyr Pro Gln Thr Asn Val Phe Val Ile
 65 70 75 80
 Cys Phe Ser Ile Ala Ser Pro Pro Ser Tyr Glu Asn Val Arg His Lys
 85 90 95
 Trp His Pro Glu Val Cys His His Cys Pro Asp Val Pro Ile Leu Leu
 100 105 110
 Val Gly Thr Lys Lys Asp Leu Arg Ala Gln Pro Asp Thr Leu Arg Arg
 115 120 125
 Leu Lys Glu Gln Ser Gln Ala Pro Ile Thr Pro Gln Gln Gly Gln Ala
 130 135 140
 Leu Ala Lys Gln Ile His Ala Val Arg Tyr Leu Glu Cys Ser Ala Leu
 145 150 155 160
 Gln Gln Asp Gly Val Lys Glu Val Phe Ala Glu Ala Val Arg Ala Val
 165 170 175
 Leu Asn Pro Thr Pro Ile Lys Arg Gly Arg Ser Cys Ile Leu Leu
 180 185 190

<210> 151
 <211> 2292
 <212> DNA
 <213> Homo sapiens

<220>
 <221> CDS
 <222> (1)..(2292)

<400> 151
 atg gtg agc aag ggc gag gag ctg ttc acc ggg gtg gtg ccc atc ctg 48
 Met Val Ser Lys Gly Glu Glu Leu Phe Thr Gly Val Val Pro Ile Leu
 1 5 10 15
 gtc gag ctg gac ggc gac gta aac ggc cac aag ttc agc gtg tcc ggc 96
 Val Glu Leu Asp Gly Asp Val Asn Gly His Lys Phe Ser Val Ser Gly
 20 25 30
 gag ggc gag ggc gat gcc acc tac ggc aag ctg acc ctg aag ttc atc 144
 Glu Gly Glu Gly Asp Ala Thr Tyr Gly Lys Leu Thr Leu Lys Phe Ile
 35 40 45
 tgc acc acc ggc aag ctg ccc gtg ccc tgg ccc acc ctc gtg acc acc 192
 Cys Thr Thr Gly Lys Leu Pro Val Pro Trp Pro Thr Leu Val Thr Thr
 50 55 60
 ctg ggc tac ggc ctg cag tgc ttc gcc cgc tac ccc gac cac atg aag 240
 Leu Gly Tyr Gly Leu Gln Cys Phe Ala Arg Tyr Pro Asp His Met Lys
 65 70 75 80
 cag cac gac ttc ttc aag tcc gcc atg ccc gaa ggc tac gtc cag gag 288
 Gln His Asp Phe Phe Lys Ser Ala Met Pro Glu Gly Tyr Val Gln Glu
 85 90 95
 cgc acc atc ttc ttc aag gac gac ggc aac tac aag acc cgc gcc gag 336
 Arg Thr Ile Phe Phe Lys Asp Asp Gly Asn Tyr Lys Thr Arg Ala Glu
 100 105 110
 gtg aag ttc gag ggc gac acc ctg gtg aac cgc atc gag ctg aag ggc 384
 Val Lys Phe Glu Gly Asp Thr Leu Val Asn Arg Ile Glu Leu Lys Gly
 115 120 125
 atc gac ttc aag gag gac ggc aac atc ctg ggg cac aag ctg gag tac 432
 Ile Asp Phe Lys Glu Asp Gly Asn Ile Leu Gly His Lys Leu Glu Tyr
 130 135 140
 aac tac aac agc cac aac gtc tat atc acc gcc gac aag cag aag aac 480
 Asn Tyr Asn Ser His Asn Val Tyr Ile Thr Ala Asp Lys Gln Lys Asn
 145 150 155 160
 ggc atc aag gcc aac ttc aag atc cgc cac aac atc gag gac ggc ggc 528
 Gly Ile Lys Ala Asn Phe Lys Ile Arg His Asn Ile Glu Asp Gly Gly
 165 170 175
 gtg cag ctc gcc gac cac tac cag cag aac acc ccc atc ggc gac ggc 576
 Val Gln Leu Ala Asp His Tyr Gln Gln Asn Thr Pro Ile Gly Asp Gly
 180 185 190
 ccc gtg ctg ctg ccc gac aac cac tac ctg agc tac cag tcc gcc ctg 624
 Pro Val Leu Leu Pro Asp Asn His Tyr Leu Ser Tyr Gln Ser Ala Leu
 195 200 205
 agc aaa gac ccc aac gag aag cgc gat cac atg gtc ctg ctg gag ttc 672
 Ser Lys Asp Pro Asn Glu Lys Arg Asp His Met Val Leu Leu Glu Phe
 210 215 220
 gtg acc gcc gcc ctc gag aaa gag aaa gag cgg cca gag att tct ctc 720
 Val Thr Ala Ala Leu Glu Lys Glu Lys Glu Arg Pro Glu Ile Ser Leu
 225 230 235 240
 cct tca gat ttt gaa cac aca att cat gtc ggt ttt gat gct gtc aca 768
 Pro Ser Asp Phe Glu His Thr Ile His Val Gly Phe Asp Ala Val Thr
 245 250 255
 ggg gag ttt acg gga atg cca gag cag tgg gcc cgc ttg ctt cag aca 816
 Gly Glu Phe Thr Gly Met Pro Glu Gln Trp Ala Arg Leu Leu Gln Thr
 260 265 270
 tca aat atc act aag tcg gag cag aag aaa aac ccg cag gct gtt ctg 864
 Ser Asn Ile Thr Lys Ser Glu Gln Lys Lys Asn Pro Gln Ala Val Leu
 275 280 285
 gat gtg ttg gag ttt tac aac tcg aag aag aca tcc aac agc cag aaa 912
 Asp Val Leu Glu Phe Tyr Asn Ser Lys Lys Thr Ser Asn Ser Gln Lys
 290 295 300
 tac atg agc ttt aca gat aag tca gct tcc gga ggt gga acc ggt ggt 960
 Tyr Met Ser Phe Thr Asp Lys Ser Ala Ser Gly Gly Gly Thr Gly Gly
 305 310 315 320
 gga ggt acc atg cag gcc atc aag tgt gtg gtg gtg gga gac gga gct 1008
 Gly Gly Thr Met Gln Ala Ile Lys Cys Val Val Val Gly Asp Gly Ala
 325 330 335
 gta ggt aaa act tgc cta ctg atc agt tac aca acc aat gca ttt cct 1056
 Val Gly Lys Thr Cys Leu Leu Ile Ser Tyr Thr Thr Asn Ala Phe Pro
 340 345 350
 gga gaa tat atc cct act gtc ttt gac aat tat tct gcc aat gtt atg 1104

Gly	Glu	Tyr	Ile	Pro	Thr	Val	Phe	Asp	Asn	Tyr	Ser	Ala	Asn	Val	Met	
		355					360					365				
gta	gat	gga	aaa	ccg	gtg	aat	ctg	ggc	tta	tgg	gat	aca	gct	gga	caa	1152
Val	Asp	Gly	Lys	Pro	Val	Asn	Leu	Gly	Leu	Trp	Asp	Thr	Ala	Gly	Gln	
		370				375					380					
gaa	gat	tat	gac	aga	tta	cgc	ccc	cta	tcc	tat	ccg	caa	aca	gat	gtg	1200
Glu	Asp	Tyr	Asp	Arg	Leu	Arg	Pro	Leu	Ser	Tyr	Pro	Gln	Thr	Asp	Val	
385					390					395					400	
ttc	tta	att	tgc	ttt	tcc	ctt	gtg	agt	cct	gca	tca	ttt	gaa	aat	gtc	1248
Phe	Leu	Ile	Cys	Phe	Ser	Leu	Val	Ser	Pro	Ala	Ser	Phe	Glu	Asn	Val	
				405					410					415		
cgt	gca	aag	tgg	tat	cct	gag	gtg	cgg	cac	cac	tgt	ccc	aac	act	ccc	1296
Arg	Ala	Lys	Trp	Tyr	Pro	Glu	Val	Arg	His	His	Cys	Pro	Asn	Thr	Pro	
			420					425					430			
atc	atc	cta	gtg	gga	act	aaa	ctt	gat	ctt	agg	gat	gat	aaa	gac	acg	1344
Ile	Ile	Leu	Val	Gly	Thr	Lys	Leu	Asp	Leu	Arg	Asp	Asp	Lys	Asp	Thr	
		435				440						445				
atc	gag	aaa	ctg	aag	gag	aag	aag	ctg	act	ccc	atc	acc	tat	ccg	cag	1392
Ile	Glu	Lys	Leu	Lys	Glu	Lys	Lys	Leu	Thr	Pro	Ile	Thr	Tyr	Pro	Gln	
		450				455					460					
ggg	cta	gcc	atg	gct	aag	gag	att	ggg	gct	gta	aaa	tac	ctg	gag	tgc	1440
Gly	Leu	Ala	Met	Ala	Lys	Glu	Ile	Gly	Ala	Val	Lys	Tyr	Leu	Glu	Cys	
465					470					475					480	
tcg	gcg	ctc	aca	cag	cga	ggc	ctc	aag	aca	gtg	ttt	gac	gaa	gcg	atc	1488
Ser	Ala	Leu	Thr	Gln	Arg	Gly	Leu	Lys	Thr	Val	Phe	Asp	Glu	Ala	Ile	
				485					490					495		
cga	gca	gtc	cgc	ggc	cgc	atg	gtg	agc	aag	ggc	gag	gag	ctg	ttc	acc	1536
Arg	Ala	Val	Arg	Gly	Arg	Met	Val	Ser	Lys	Gly	Glu	Glu	Leu	Phe	Thr	
			500					505					510			
ggg	gtg	gtg	ccc	atc	ctg	gtc	gag	ctg	gac	ggc	gac	gta	aac	ggc	cac	1584
Gly	Val	Val	Pro	Ile	Leu	Val	Glu	Leu	Asp	Gly	Asp	Val	Asn	Gly	His	
		515				520						525				
aag	ttc	agc	gtg	tcc	ggc	gag	ggc	gag	ggc	gat	gcc	acc	tac	ggc	aag	1632
Lys	Phe	Ser	Val	Ser	Gly	Glu	Gly	Glu	Gly	Asp	Ala	Thr	Tyr	Gly	Lys	
		530				535				540						
ctg	acc	ctg	aag	ttc	atc	tgc	acc	acc	ggc	aag	ctg	ccc	gtg	ccc	tgg	1680
Leu	Thr	Leu	Lys	Phe	Ile	Cys	Thr	Thr	Gly	Lys	Leu	Pro	Val	Pro	Trp	
545					550					555					560	
ccc	acc	ctc	gtg	acc	acc	ctg	acc	tgg	ggc	gtg	cag	tgc	ttc	agc	cgc	1728
Pro	Thr	Leu	Val	Thr	Thr	Leu	Thr	Trp	G							

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atg gtc ctg ctg gag ttc gtg acc gcc gcc ggg atc act ctc ggc atg	2208
Met Val Leu Leu Glu Phe Val Thr Ala Ala Gly Ile Thr Leu Gly Met	
725 730 735	
gac gag ctg ggc cgc tct aga aag atg agc aaa gat ggt aaa aag aag	2256
Asp Glu Leu Gly Arg Ser Arg Lys Met Ser Lys Asp Gly Lys Lys Lys	
740 745 750	
aaa aag aag tca aag aca aag tgt gta att atg taa	2292
Lys Lys Lys Ser Lys Thr Lys Cys Val Ile Met	
755 760	

<210> 152

<211> 763

<212> PRT

<213> Homo sapiens

<400> 152

Met Val Ser Lys Gly Glu Glu Leu Phe Thr Gly Val Val Pro Ile Leu	
1 5 10 15	
Val Glu Leu Asp Gly Asp Val Asn Gly His Lys Phe Ser Val Ser Gly	
20 25 30	
Glu Gly Glu Gly Asp Ala Thr Tyr Gly Lys Leu Thr Leu Lys Phe Ile	
35 40 45	
Cys Thr Thr Gly Lys Leu Pro Val Pro Trp Pro Thr Leu Val Thr Thr	
50 55 60	
Leu Gly Tyr Gly Leu Gln Cys Phe Ala Arg Tyr Pro Asp His Met Lys	
65 70 75 80	
Gln His Asp Phe Phe Lys Ser Ala Met Pro Glu Gly Tyr Val Gln Glu	
85 90 95	
Arg Thr Ile Phe Phe Lys Asp Asp Gly Asn Tyr Lys Thr Arg Ala Glu	
100 105 110	
Val Lys Phe Glu Gly Asp Thr Leu Val Asn Arg Ile Glu Leu Lys Gly	
115 120 125	
Ile Asp Phe Lys Glu Asp Gly Asn Ile Leu Gly His Lys Leu Glu Tyr	
130 135 140	
Asn Tyr Asn Ser His Asn Val Tyr Ile Thr Ala Asp Lys Gln Lys Asn	
145 150 155 160	
Gly Ile Lys Ala Asn Phe Lys Ile Arg His Asn Ile Glu Asp Gly Gly	
165 170 175	
Val Gln Leu Ala Asp His Tyr Gln Gln Asn Thr Pro Ile Gly Asp Gly	
180 185 190	
Pro Val Leu Leu Pro Asp Asn His Tyr Leu Ser Tyr Gln Ser Ala Leu	
195 200 205	
Ser Lys Asp Pro Asn Glu Lys Arg Asp His Met Val Leu Leu Glu Phe	
210 215 220	
Val Thr Ala Ala Leu Glu Lys Glu Lys Glu Arg Pro Glu Ile Ser Leu	
225 230 235 240	
Pro Ser Asp Phe Glu His Thr Ile His Val Gly Phe Asp Ala Val Thr	
245 250 255	
Gly Glu Phe Thr Gly Met Pro Glu Gln Trp Ala Arg Leu Leu Gln Thr	
260 265 270	
Ser Asn Ile Thr Lys Ser Glu Gln Lys Lys Asn Pro Gln Ala Val Leu	
275 280 285	
Asp Val Leu Glu Phe Tyr Asn Ser Lys Lys Thr Ser Asn Ser Gln Lys	
290 295 300	
Tyr Met Ser Phe Thr Asp Lys Ser Ala Ser Gly Gly Thr Gly Gly	
305 310 315 320	
Gly Gly Thr Met Gln Ala Ile Lys Cys Val Val Val Gly Asp Gly Ala	
325 330 335	
Val Gly Lys Thr Cys Leu Leu Ile Ser Tyr Thr Thr Asn Ala Phe Pro	
340 345 350	
Gly Glu Tyr Ile Pro Thr Val Phe Asp Asn Tyr Ser Ala Asn Val Met	
355 360 365	
Val Asp Gly Lys Pro Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln	
370 375 380	
Glu Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Gln Thr Asp Val	
385 390 395 400	
Phe Leu Ile Cys Phe Ser Leu Val Ser Pro Ala Ser Phe Glu Asn Val	

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Arg	Ala	Lys	Trp	405	Tyr	Pro	Glu	Val	Arg	410	His	His	Cys	Pro	Asn	415	Thr	Pro
			420	Gly	Thr	Lys	Leu	Asp	Leu	425	Arg	Asp	Asp	Lys	430	Asp	Thr	
Ile	Ile	Leu	Val	435	Gly	Thr	Lys	Leu	440	Asp	Leu	Arg	Asp	Asp	Lys	445	Asp	Thr
Ile	Glu	Lys	Leu	450	Lys	Glu	Lys	Lys	Leu	455	Thr	Pro	Ile	Thr	Tyr	460	Pro	Gln
Gly	Leu	Ala	Met	465	Ala	Lys	Glu	Ile	Gly	470	Ala	Val	Lys	Tyr	Leu	475	Glu	Cys
Ser	Ala	Leu	Thr	485	Gln	Arg	Gly	Leu	Lys	490	Thr	Val	Phe	Asp	Glu	495	Ala	Ile
Arg	Ala	Val	Arg	500	Gly	Arg	Met	Val	Ser	505	Lys	Gly	Glu	Glu	Leu	510	Phe	Thr
Gly	Val	Val	Pro	515	Ile	Leu	Val	Glu	Leu	520	Asp	Gly	Asp	Val	Asn	525	Gly	His
Lys	Phe	Ser	Val	530	Ser	Gly	Glu	Gly	Glu	535	Gly	Asp	Ala	Thr	Tyr	540	Gly	Lys
Leu	Thr	Leu	Lys	545	Phe	Ile	Cys	Thr	Thr	550	Gly	Lys	Leu	Pro	Val	555	Pro	Trp
Pro	Thr	Leu	Val	565	Thr	Thr	Leu	Thr	Trp	570	Gly	Val	Gln	Cys	Phe	575	Ser	Arg
Tyr	Pro	Asp	His	580	Met	Lys	Gln	His	Asp	585	Phe	Phe	Lys	Ser	Ala	590	Met	Pro
Glu	Gly	Tyr	Val	595	Gln	Glu	Arg	Thr	Ile	600	Phe	Phe	Lys	Asp	Asp	605	Gly	Asn
Tyr	Lys	Thr	Arg	610	Ala	Glu	Val	Lys	Phe	615	Glu	Gly	Asp	Thr	Leu	620	Val	Asn
Arg	Ile	Glu	Leu	625	Lys	Gly	Ile	Asp	Phe	630	Lys	Glu	Asp	Gly	Asn	635	Ile	Leu
Gly	His	Lys	Leu	645	Glu	Tyr	Asn	Tyr	Ile	650	Ser	His	Asn	Val	Tyr	655	Ile	Thr
Ala	Asp	Lys	Gln	660	Lys	Asn	Gly	Ile	Lys	665	Ala	Asn	Phe	Lys	Ile	670	Arg	His
Asn	Ile	Glu	Asp	675	Gly	Ser	Val	Gln	Leu	680	Ala	Asp	His	Tyr	Gln	685	Gln	Asn
Thr	Pro	Ile	Gly	690	Asp	Gly	Pro	Val	Leu	695	Leu	Leu	Pro	Asp	Asn	700	His	Tyr
Ser	Thr	Gln	Ser	705	Ala	Leu	Ser	Lys	Asp	710	Pro	Asn	Glu	Lys	Arg	715	Asp	His
Met	Val	Leu	Leu	725	Glu	Phe	Val	Thr	Ala	730	Ala	Gly	Ile	Thr	Leu	735	Gly	Met
Asp	Glu	Leu	Gly	740	Arg	Ser	Arg	Lys	Met	745	Ser	Lys	Asp	Gly	Lys	750	Lys	Lys
Lys	Lys	Lys	Ser	755	Lys	Thr	Lys	Cys	Val	760	Ile	Met						

<210> 153

<211> 2289

<212> DNA

<213> Homo sapiens

<220>

<221> CDS

<222> (1)...(2289)

<400> 153

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Met	Val	Ser	Lys	Gly	Glu	Glu	Leu	Phe	Thr	Gly	Val	Val	Pro	Ile	Leu	
1			5					10					15			
gtc	gag	ctg	gac	ggc	gac	gta	aac	ggc	cac	aag	ttc	agc	gtg	tcc	ggc	96
Val	Glu	Leu	Asp	Gly	Asp	Val	Asn	Gly	His	Lys	Phe	Ser	Val	Ser	Gly	
			20					25					30			
gag	ggc	gag	ggc	gat	gcc	acc	tac	ggc	aag	ctg	acc	ctg	aag	ttc	atc	144
Glu	Gly	Glu	Gly	Asp	Ala	Thr	Tyr	Gly	Lys	Leu	Thr	Leu	Lys	Phe	Ile	
			35					40					45			
tgc	acc	acc	ggc	aag	ctg	ccc	gtg	ccc	tgg	ccc	acc	ctc	gtg	acc	acc	192
Cys	Thr	Thr	Gly	Lys	Leu	Pro	Val	Pro	Trp	Pro	Thr	Leu	Val	Thr	Thr	
			50					55					60			

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ctg ggc tac ggc ctg cag tgc ttc gcc cgc tac ccc gac cac atg aag	240
Leu Gly Tyr Gly Leu Gln Cys Phe Ala Arg Tyr Pro Asp His Met Lys	
65 70 75 80	
cag cac gac ttc ttc aag tcc gcc atg ccc gaa ggc tac gtc cag gag	288
Gln His Asp Phe Phe Lys Ser Ala Met Pro Glu Gly Tyr Val Gln Glu	
85 90 95	
cgc acc atc ttc ttc aag gac gac ggc aac tac aag acc cgc gcc gag	336
Arg Thr Ile Phe Phe Lys Asp Asp Gly Asn Tyr Lys Thr Arg Ala Glu	
100 105 110	
gtg aag ttc gag ggc gac acc ctg gtg aac cgc atc gag ctg aag ggc	384
Val Lys Phe Glu Gly Asp Thr Leu Val Asn Arg Ile Glu Leu Lys Gly	
115 120 125	
atc gac ttc aag gag gac ggc aac atc ctg ggg cac aag ctg gag tac	432
Ile Asp Phe Lys Glu Asp Gly Asn Ile Leu Gly His Lys Leu Glu Tyr	
130 135 140	
aac tac aac agc cac aac gtc tat atc acc gcc gac aag cag aag aac	480
Asn Tyr Asn Ser His Asn Val Tyr Ile Thr Ala Asp Lys Gln Lys Asn	
145 150 155 160	
ggc atc aag gcc aac ttc aag atc cgc cac aac atc gag gac ggc ggc	528
Gly Ile Lys Ala Asn Phe Lys Ile Arg His Asn Ile Glu Asp Gly Gly	
165 170 175	
gtg cag ctc gcc gac cac tac cag cag aac acc ccc atc ggc gac ggc	576
Val Gln Leu Ala Asp His Tyr Gln Gln Asn Thr Pro Ile Gly Asp Gly	
180 185 190	
ccc gtg ctg ctg ccc gac aac cac tac ctg agc tac cag tcc gcc ctg	624
Pro Val Leu Leu Pro Asp Asn His Tyr Leu Ser Tyr Gln Ser Ala Leu	
195 200 205	
agc aaa gac ccc aac gag aag cgc gat cac atg gtc ctg ctg gag ttc	672
Ser Lys Asp Pro Asn Glu Lys Arg Asp His Met Val Leu Leu Glu Phe	
210 215 220	
gtg acc gcc gcc ctc gag aaa gag aaa gag cgg cca gag att tct ctc	720
Val Thr Ala Ala Leu Glu Lys Glu Lys Glu Arg Pro Glu Ile Ser Leu	
225 230 235 240	
cct tca gat ttt gaa cac aca att cat gtc ggt ttt gat gct gtc aca	768
Pro Ser Asp Phe Glu His Thr Ile His Val Gly Phe Asp Ala Val Thr	
245 250 255	
ggg gag ttt acg gga atg cca gag cag tgg gcc cgc ttg ctt cag aca	816
Gly Glu Phe Thr Gly Met Pro Glu Gln Trp Ala Arg Leu Leu Gln Thr	
260 265 270	
tca aat atc act aag tcg gag cag aag aaa aac ccg cag gct gtt ctg	864
Ser Asn Ile Thr Lys Ser Glu Gln Lys Lys Asn Pro Gln Ala Val Leu	
275 280 285	
gat gtg ttg gag ttt tac aac tcg aag aag aca tcc aac agc cag aaa	912
Asp Val Leu Glu Phe Tyr Asn Ser Lys Lys Thr Ser Asn Ser Gln Lys	
290 295 300	
tac atg agc ttt aca gat aag tca gct tcc gga ggt gga acc ggt ggt	960
Tyr Met Ser Phe Thr Asp Lys Ser Ala Ser Gly Gly Gly Thr Gly Gly	
305 310 315 320	
gga ggt acc cag aca att aag tgt gtt gtt gtg ggc gat ggt gct gtt	1008
Gly Gly Thr Gln Thr Ile Lys Cys Val Val Val Gly Asp Gly Ala Val	
325 330 335	
ggt aaa aca tgt ctc ctg ata tcc tac aca aca aac aaa ttt cca tcg	1056
Gly Lys Thr Cys Leu Leu Ile Ser Tyr Thr Thr Asn Lys Phe Pro Ser	
340 345 350	
gaa tat gta ccg act gtt ttt gac aac tat gca gtc aca gtt atg att	1104
Glu Tyr Val Pro Thr Val Phe Asp Asn Tyr Ala Val Thr Val Met Ile	
355 360 365	
ggt gga gaa cca tat act ctt gga ctt ttt gat act gca ggc caa gag	1152
Gly Gly Glu Pro Tyr Thr Leu Gly Leu Phe Asp Thr Ala Gly Gln Glu	
370 375 380	
gat tat gac aga tta cga ccg ctg agt tat cca caa aca gat gta ttt	1200
Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Gln Thr Asp Val Phe	
385 390 395 400	
cta gtc tgt ttt tca gtg gtc tct cca tct tca ttt gaa aac gtg aaa	1248
Leu Val Cys Phe Ser Val Val Ser Pro Ser Ser Phe Glu Asn Val Lys	
405 410 415	
gaa aag tgg gtg cct gag ata act cac cac tgt cca aag act cct ttc	1296
Glu Lys Trp Val Pro Glu Ile Thr His His Cys Pro Lys Thr Pro Phe	

123/291

ttg	ctt	gtt	ggg	act	caa	att	gat	ctc	aga	gat	gac	ccc	tct	act	att	1344
Leu	Leu	Val	Gly	Thr	Gln	Ile	Asp	Leu	Arg	Asp	Asp	Pro	Ser	Thr	Ile	
		435					440					445				
gag	aaa	ctt	gcc	aag	aac	aaa	cag	aag	cct	atc	act	cca	gag	act	gct	1392
Glu	Lys	Leu	Ala	Lys	Asn	Lys	Gln	Lys	Pro	Ile	Thr	Pro	Glu	Thr	Ala	
		450					455					460				
gaa	aag	ctg	gcc	cgt	gac	ctg	aag	gct	gtc	aag	tat	gtg	gag	tgt	tct	1440
Glu	Lys	Leu	Ala	Arg	Asp	Leu	Lys	Ala	Val	Lys	Tyr	Val	Glu	Cys	Ser	
		465			470					475					480	
gca	ctt	aca	cag	aga	ggt	ctg	aag	aat	gtg	ttt	gat	gag	gct	atc	cta	1488
Ala	Leu	Thr	Gln	Arg	Gly	Leu	Lys	Asn	Val	Phe	Asp	Glu	Ala	Ile	Leu	
				485					490					495		
gct	gcc	ggc	ggc	cgc	atg	gtg	agc	aag	ggc	gag	gag	ctg	ttc	acc	ggg	1536
Ala	Ala	Gly	Gly	Arg	Met	Val	Ser	Lys	Gly	Glu	Glu	Leu	Phe	Thr	Gly	
			500					505					510			
gtg	gtg	ccc	atc	ctg	gtc	gag	ctg	gac	ggc	gac	gta	aac	ggc	cac	aag	1584
Val	Val	Pro	Ile	Leu	Val	Glu	Leu	Asp	Gly	Asp	Val	Asn	Gly	His	Lys	
		515					520					525				
ttc	agc	gtg	tcc	ggc	gag	ggc	gag	ggc	gat	gcc	acc	tac	ggc	aag	ctg	1632
Phe	Ser	Val	Ser	Gly	Glu	Gly	Glu	Gly	Asp	Ala	Thr	Tyr	Gly	Lys	Leu	
		530				535					540					
acc	ctg	aag	ttc	atc	tgc	acc	acc	ggc	aag	ctg	ccc	gtg	ccc	tgg	ccc	1680
Thr	Leu	Lys	Phe	Ile	Cys	Thr	Thr	Gly	Lys	Leu	Pro	Val	Pro	Trp	Pro	
		545			550					555					560	
acc	ctc	gtg	acc	acc	ctg	acc	tgg	ggc	gtg	cag	tgc	ttc	agc	cgc	tac	1728
Thr	Leu	Val	Thr	Thr	Leu	Thr	Trp	Gly	Val	Gln	Cys	Phe	Ser	Arg	Tyr	
				565				570						575		
ccc	gac	cac	atg	aag	cag	cac	gac	ttc	ttc	aag	tcc	gcc	atg	ccc	gaa	1776
Pro	Asp	His	Met	Lys	Gln	His	Asp	Phe	Phe	Lys	Ser	Ala	Met	Pro	Glu	
			580					585					590			
ggc	tac	gtc	cag	gag	cgc	acc	atc	ttc	aag	gac	gac	ggc	aac	tac		1824
Gly	Tyr	Val	Gln	Glu	Arg	Thr	Ile	Phe	Phe	Lys	Asp	Asp	Gly	Asn	Tyr	
		595					600					605				
aag	acc	cgc	gcc	gag	gtg	aag	ttc	gag	ggc	gac	acc	ctg	gtg	aac	cgc	1872
Lys	Thr	Arg	Ala	Glu	Val	Lys	Phe	Glu	Gly	Asp	Thr	Leu	Val	Asn	Arg	
		610				615					620					
atc	gag	ctg	aag	ggc	atc	gac	ttc	aag	gag	gac	ggc	aac	atc	ctg	ggg	1920
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<210> 154

<211> 762

<212> PRT

<213> Homo sapiens

<400> 154

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      20      25      30
Glu Gly Glu Gly Asp Ala Thr Tyr Gly Lys Leu Thr Leu Lys Phe Ile
      35      40      45
Cys Thr Thr Gly Lys Leu Pro Val Pro Trp Pro Thr Leu Val Thr Thr
      50      55      60
Leu Gly Tyr Gly Leu Gln Cys Phe Ala Arg Tyr Pro Asp His Met Lys
65      70      75      80
Gln His Asp Phe Phe Lys Ser Ala Met Pro Glu Gly Tyr Val Gln Glu
      85      90      95
Arg Thr Ile Phe Phe Lys Asp Asp Gly Asn Tyr Lys Thr Arg Ala Glu
      100      105      110
Val Lys Phe Glu Gly Asp Thr Leu Val Asn Arg Ile Glu Leu Lys Gly
      115      120      125
Ile Asp Phe Lys Glu Asp Gly Asn Ile Leu Gly His Lys Leu Glu Tyr
130      135      140
Asn Tyr Asn Ser His Asn Val Tyr Ile Thr Ala Asp Lys Gln Lys Asn
145      150      155      160
Gly Ile Lys Ala Asn Phe Lys Ile Arg His Asn Ile Glu Asp Gly Gly
      165      170      175
Val Gln Leu Ala Asp His Tyr Gln Gln Asn Thr Pro Ile Gly Asp Gly
      180      185      190
Pro Val Leu Leu Pro Asp Asn His Tyr Leu Ser Tyr Gln Ser Ala Leu
195      200      205
Ser Lys Asp Pro Asn Glu Lys Arg Asp His Met Val Leu Leu Glu Phe
210      215      220
Val Thr Ala Ala Leu Glu Lys Glu Lys Glu Arg Pro Glu Ile Ser Leu
225      230      235      240
Pro Ser Asp Phe Glu His Thr Ile His Val Gly Phe Asp Ala Val Thr
      245      250      255
Gly Glu Phe Thr Gly Met Pro Glu Gln Trp Ala Arg Leu Leu Gln Thr
260      265      270
Ser Asn Ile Thr Lys Ser Glu Gln Lys Lys Asn Pro Gln Ala Val Leu
275      280      285
Asp Val Leu Glu Phe Tyr Asn Ser Lys Lys Thr Ser Asn Ser Gln Lys
290      295      300
Tyr Met Ser Phe Thr Asp Lys Ser Ala Ser Gly Gly Gly Thr Gly Gly
305      310      315      320
Gly Gly Thr Gln Thr Ile Lys Cys Val Val Gly Asp Gly Ala Val
      325      330      335
Gly Lys Thr Cys Leu Ile Ser Tyr Thr Thr Asn Lys Phe Pro Ser
340      345      350
Glu Tyr Val Pro Thr Val Phe Asp Asn Tyr Ala Val Thr Val Met Ile
355      360      365
Gly Gly Glu Pro Tyr Thr Leu Gly Leu Phe Asp Thr Ala Gly Gln Glu
370      375      380
Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Gln Thr Asp Val Phe
385      390      395      400
Leu Val Cys Phe Ser Val Val Ser Pro Ser Ser Phe Glu Asn Val Lys
      405      410      415
Glu Lys Trp Val Pro Glu Ile Thr His His Cys Pro Lys Thr Pro Phe
420      425      430
Leu Leu Val Gly Thr Gln Ile Asp Leu Arg Asp Asp Pro Ser Thr Ile
435      440      445
Glu Lys Leu Ala Lys Asn Lys Gln Lys Pro Ile Thr Pro Glu Thr Ala
450      455      460
Glu Lys Leu Ala Arg Asp Leu Lys Ala Val Lys Tyr Val Glu Cys Ser
465      470      475      480
Ala Leu Thr Gln Arg Gly Leu Lys Asn Val Phe Asp Glu Ala Ile Leu
      485      490      495
Ala Ala Gly Gly Arg Met Val Ser Lys Gly Glu Glu Leu Phe Thr Gly
500      505      510

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Val Val Pro Ile Leu Val Glu Leu Asp Gly Asp Val Asn Gly His Lys
 515 520 525
 Phe Ser Val Ser Gly Glu Gly Glu Gly Asp Ala Thr Tyr Gly Lys Leu
 530 535 540
 Thr Leu Lys Phe Ile Cys Thr Thr Gly Lys Leu Pro Val Pro Trp Pro
 545 550 555 560
 Thr Leu Val Thr Thr Leu Thr Trp Gly Val Gln Cys Phe Ser Arg Tyr
 565 570 575
 Pro Asp His Met Lys Gln His Asp Phe Phe Lys Ser Ala Met Pro Glu
 580 585 590
 Gly Tyr Val Gln Glu Arg Thr Ile Phe Phe Lys Asp Asp Gly Asn Tyr
 595 600 605
 Lys Thr Arg Ala Glu Val Lys Phe Glu Gly Asp Thr Leu Val Asn Arg
 610 615 620
 Ile Glu Leu Lys Gly Ile Asp Phe Lys Glu Asp Gly Asn Ile Leu Gly
 625 630 635 640
 His Lys Leu Glu Tyr Asn Tyr Ile Ser His Asn Val Tyr Ile Thr Ala
 645 650 655
 Asp Lys Gln Lys Asn Gly Ile Lys Ala Asn Phe Lys Ile Arg His Asn
 660 665 670
 Ile Glu Asp Gly Ser Val Gln Leu Ala Asp His Tyr Gln Gln Asn Thr
 675 680 685
 Pro Ile Gly Asp Gly Pro Val Leu Leu Pro Asp Asn His Tyr Leu Ser
 690 695 700
 Thr Gln Ser Ala Leu Ser Lys Asp Pro Asn Glu Lys Arg Asp His Met
 705 710 715 720
 Val Leu Leu Glu Phe Val Thr Ala Ala Gly Ile Thr Leu Gly Met Asp
 725 730 735
 Glu Leu Gly Arg Ser Arg Lys Met Ser Lys Asp Gly Lys Lys Lys
 740 745 750
 Lys Lys Ser Lys Thr Lys Cys Val Ile Met
 755 760

<210> 155

<211> 1139

<212> DNA

<213> Arabidopsis thaliana

<220>

<221> CDS

<222> (66)..(875)

<400> 155

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caaca atg gca gat gca aac gaa gta gtg gaa tgg gcc aac aat tta aag 110
 Met Ala Asp Ala Asn Glu Val Val Glu Trp Ala Asn Asn Leu Lys
 1 5 10 15

tgg gat aaa tat gct gga aat aaa gaa att gtt gat gga ttg gcc gct 158
 Trp Asp Lys Tyr Ala Gly Asn Lys Glu Ile Val Asp Gly Leu Ala Ala
 20 25 30

ttg aga caa aaa atc aca gct ttg gac ggc gct gaa gga ggc tct ggt 206
 Leu Arg Gln Lys Ile Thr Ala Leu Asp Gly Ala Glu Gly Gly Ser Gly
 35 40 45

ggc aat caa aga gtt aaa tta gta gtt gtc ggt gat ggt gcc gtc ggc 254
 Gly Asn Gln Arg Val Lys Leu Val Val Val Gly Asp Gly Ala Val Gly
 50 55 60

aaa aca tct ctg ttg att tca ttc gct gaa aac aaa ttc cct gag gat 302
 Lys Thr Ser Leu Leu Ile Ser Phe Ala Glu Asn Lys Phe Pro Glu Asp
 65 70 75

tac gtc cct aca gtc ttc gaa aac tac act tct aaa atc act cgc gac 350
 Tyr Val Pro Thr Val Phe Glu Asn Tyr Thr Ser Lys Ile Thr Arg Asp
 80 85 90 95

gat ggt aca ctt gtt ctg ttg cat ttg tgg gat aca gcc ggt caa gag 398
 Asp Gly Thr Leu Val Leu Leu His Leu Trp Asp Thr Ala Gly Gln Glu
 100 105 110

gac tac gac cga ttg aga cct ttg agt tat cct ggc gct gat gtc atc 446

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Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Gly Ala Asp Val Ile
 115 120 125
 ctg ctc tgt ttc tcc acc gtc act gcc tcg tca ttc gcc tcc att aaa 494
 Leu Leu Cys Phe Ser Thr Val Thr Ala Ser Ser Phe Ala Ser Ile Lys
 130 135 140
 gaa aag tgg tac ccc gaa gtc aac cac tac gtg ccc gat gct cct tat 542
 Glu Lys Trp Tyr Pro Glu Val Asn His Tyr Val Pro Asp Ala Pro Tyr
 145 150 155
 att ttg gtc ggc acc aag ctc gac ttg cgt gag gct ggt ctg ccc gat 590
 Ile Leu Val Gly Thr Lys Leu Asp Leu Arg Glu Ala Gly Leu Pro Asp
 160 165 170 175
 ccc tcc act ggt gag tca gat ccc gtc acc ccc gag aag gct gag gag 638
 Pro Ser Thr Gly Glu Ser Asp Pro Val Thr Pro Glu Lys Ala Glu Glu
 180 185 190
 atg cga aag caa atc aaa gcg ttg aag tat att gaa gtc tct gcc aag 686
 Met Arg Lys Lys Ile Lys Ala Leu Lys Tyr Ile Glu Val Ser Ala Lys
 195 200 205
 ada cga aag aac ttg cag act ctg ttt tca gaa gcc gtg gac att gtc 734
 Thr Arg Lys Asn Leu Gln Thr Leu Phe Ser Glu Ala Val Asp Ile Val
 210 215 220
 ttg gct gaa cga cgc gca cac gag cct ccc aag ccc acc gct gct tca 782
 Leu Ala Glu Arg Arg Ala His Glu Pro Pro Lys Pro Thr Ala Ala Ser
 225 230 235
 tcg acg aac ggc act aac ggc act aag act gag cac act cct cgc gaa 830
 Ser Thr Asn Gly Thr Asn Gly Thr Lys Thr Glu His Thr Pro Arg Glu
 240 245 250 255
 gag ccc atc cga aag aag aag gag cgt cgc tgc ttg ttg atg taagagccct 882
 Glu Pro Ile Arg Lys Lys Lys Glu Arg Arg Cys Leu Leu Met
 260 265
 gtgattggtc actctaaccat cgactcgaga tctgcactat tactatttta tttgtcgttt 942

 ttaactttat ttaatcaaaa aaccctttca accaataagc cacgataaga gtcgtgcagt 1002

 caaattttatt ttggtagccc ttggatctgc tatcaagatt ttcttgtatt atcgacttgt 1062

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 aaaaaaaaaa aaaaaaa 1139

<210> 156

<211> 269

<212> PRT

<213> Arabidopsis thaliana

<400> 156

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 35 40 45
 Asn Gln Arg Val Lys Leu Val Val Val Gly Asp Gly Ala Val Gly Lys
 50 55 60
 Thr Ser Leu Leu Ile Ser Phe Ala Glu Asn Lys Phe Pro Glu Asp Tyr
 65 70 75 80
 Val Pro Thr Val Phe Glu Asn Tyr Thr Ser Lys Ile Thr Arg Asp Asp
 85 90 95
 Gly Thr Leu Val Leu Leu His Leu Trp Asp Thr Ala Gly Gln Glu Asp
 100 105 110
 Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Gly Ala Asp Val Ile Leu
 115 120 125

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Leu Cys Phe Ser Thr Val Thr Ala Ser Ser Phe Ala Ser Ile Lys Glu
 130 135 140
 Lys Trp Tyr Pro Glu Val Asn His Tyr Val Pro Asp Ala Pro Tyr Ile
 145 150 155 160
 Leu Val Gly Thr Lys Leu Asp Leu Arg Glu Ala Gly Leu Pro Asp Pro
 165 170 175
 Ser Thr Gly Glu Ser Asp Pro Val Thr Pro Glu Lys Ala Glu Glu Met
 180 185 190
 Arg Lys Gln Ile Lys Ala Leu Lys Tyr Ile Glu Val Ser Ala Lys Thr
 195 200 205
 Arg Lys Asn Leu Gln Thr Leu Phe Ser Glu Ala Val Asp Ile Val Leu
 210 215 220
 Ala Glu Arg Arg Ala His Glu Pro Pro Lys Pro Thr Ala Ala Ser Ser
 225 230 235 240
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 245 250 255
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 260 265

<210> 157

<211> 582

<212> DNA

<213> Caenorhabditis elegans

<220>

<221> CDS

<222> (1)..(582)

<400> 157

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acg tgt ctc ctg cta tcg tac act aca aac gct ttt ccc gga gaa tat	96
Thr Cys Leu Leu Leu Ser Tyr Thr Asn Ala Phe Pro Gly Glu Tyr	
20 25 30	
att cta acg gtg ttc gac acc tac tca aca aat gtg atg gtc gac gga	144
Ile Leu Thr Val Phe Asp Thr Tyr Ser Thr Asn Val Met Val Asp Gly	
35 40 45	
cgg cca ata aat ctc agc cta tgg gac aca gct gga cag gaa gat tac	192
Arg Pro Ile Asn Leu Ser Leu Trp Asp Thr Ala Gly Gln Glu Asp Tyr	
50 55 60	
gat caa ttc cgc caa cat ttc cac aaa aaa ttt cca caa aca gac gta	240
Asp Gln Phe Arg Gln His Phe His Lys Lys Phe Pro Gln Thr Asp Val	
65 70 75 80	
ttt ctc gta tgc ttt gca ttg aat aat aat gtt cgt gca aaa tgg tat	288
Phe Leu Val Cys Phe Ala Leu Asn Asn Asn Val Arg Ala Lys Trp Tyr	
85 90 95	
cca gaa gta tca cat cat tgc cca aat aca ccg att att ttg gtt gga	336
Pro Glu Val Ser His His Cys Pro Asn Thr Pro Ile Ile Leu Val Gly	
100 105 110	
acg aaa gct gat ttg cgc gag gat cga gat act gtt gaa cgg ctc cgc	384
Thr Lys Ala Asp Leu Arg Glu Asp Arg Asp Thr Val Glu Arg Leu Arg	
115 120 125	
gaa agc cgg ctc caa cca gtg agc cac acc cag ggt tac gtg atg gca	432
Glu Ser Arg Leu Gln Pro Val Ser His Thr Gln Gly Tyr Val Met Ala	
130 135 140	
aag gaa atc aag gcg gtc aag tac ctg gaa tgc tcg gcg ctt acc caa	480
Lys Glu Ile Lys Ala Val Lys Tyr Leu Glu Cys Ser Ala Leu Thr Gln	
145 150 155 160	
att gga ttg aaa caa gtt ttc gat gag gca att cgt act ggg ctc acc	528
Ile Gly Leu Lys Gln Val Phe Asp Glu Ala Ile Arg Thr Gly Leu Thr	
165 170 175	
ccg cca caa aca cca caa acg aga gcc aaa aag agc aat tgc acg gtg	576
Pro Pro Gln Thr Pro Gln Thr Arg Ala Lys Lys Ser Asn Cys Thr Val	
180 185 190	
ctt taa	582
Leu	

<210> 158
 <211> 193
 <212> PRT
 <213> *Caenorhabditis elegans*

<400> 158
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 20 25 30
 Ile Leu Thr Val Phe Asp Thr Tyr Ser Thr Asn Val Met Val Asp Gly
 35 40 45
 Arg Pro Ile Asn Leu Ser Leu Trp Asp Thr Ala Gly Gln Glu Asp Tyr
 50 55 60
 Asp Gln Phe Arg Gln His Phe His Lys Lys Phe Pro Gln Thr Asp Val
 65 70 75 80
 Phe Leu Val Cys Phe Ala Leu Asn Asn Asn Val Arg Ala Lys Trp Tyr
 85 90 95
 Pro Glu Val Ser His His Cys Pro Asn Thr Pro Ile Ile Leu Val Gly
 100 105 110
 Thr Lys Ala Asp Leu Arg Glu Asp Arg Asp Thr Val Glu Arg Leu Arg
 115 120 125
 Glu Ser Arg Leu Gln Pro Val Ser His Thr Gln Gly Tyr Val Met Ala
 130 135 140
 Lys Glu Ile Lys Ala Val Lys Tyr Leu Glu Cys Ser Ala Leu Thr Gln
 145 150 155 160
 Ile Gly Leu Lys Gln Val Phe Asp Glu Ala Ile Arg Thr Gly Leu Thr
 165 170 175
 Pro Pro Gln Thr Pro Gln Thr Arg Ala Lys Lys Ser Asn Cys Thr Val
 180 185 190
 Leu

<210> 159
 <211> 576
 <212> DNA
 <213> *Ciona savignyi*

<220>
 <221> CDS
 <222> (1)..(576)

<400> 159
 atg caa act ata aag tgt gta gtt gtt gga gat ggt gct gtg ggt aaa 48
 Met Gln Thr Ile Lys Cys Val Val Val Gly Asp Gly Ala Val Gly Lys
 1 5 10 15
 acc tgt ttg cta ata tcc tat acc aca aac aag ttt cca caa gaa tat 96
 Thr Cys Leu Leu Ile Ser Tyr Thr Thr Asn Lys Phe Pro Gln Glu Tyr
 20 25 30
 gtt cca acg gtc ttc gac aac tat gcc gtc act gtt atg atc gga ggg 144
 Val Pro Thr Val Phe Asp Asn Tyr Ala Val Thr Val Met Ile Gly Gly
 35 40 45
 gaa cca tac aca ttg ggt tta ttt gat act gca ggc cag gaa gat tat 192
 Glu Pro Tyr Thr Leu Gly Leu Phe Asp Thr Ala Gly Gln Glu Asp Tyr
 50 55 60
 gac agg tta agg cct ctc agt tat cca caa act gat gtg ttt ttg gtt 240
 Asp Arg Leu Arg Pro Leu Ser Tyr Pro Gln Thr Asp Val Phe Leu Val
 65 70 75 80
 tgt ttt tct gtt gta tca ccg tca tca tat gaa aat ata aaa gaa aag 288
 Cys Phe Ser Val Val Ser Pro Ser Ser Tyr Glu Asn Ile Lys Glu Lys
 85 90 95
 tgg gtc ccg gaa atc acc cat cat tgt cca aag acg cca ttt tta ttg 336
 Trp Val Pro Glu Ile Thr His His Cys Pro Lys Thr Pro Phe Leu Leu
 100 105 110
 gtt gga acc cag gtt gat ttg cga gat gat gct gca aca att gaa aaa 384
 Val Gly Thr Gln Val Asp Leu Arg Asp Asp Ala Ala Thr Ile Glu Lys

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115	120	125	
ctt tca aag aac aaa cag aaa gct ata act cca gat ttg ggt gat aaa			432
Leu Ser Lys Asn Lys Gln Lys Ala Ile Thr Pro Asp Leu Gly Asp Lys			
130	135	140	
ctg gca aga gag tta aaa gca gta aaa tat gtc gag tgc tct gcc ctt			480
Leu Ala Arg Glu Leu Lys Ala Val Lys Tyr Val Glu Cys Ser Ala Leu			
145	150	155	160
act caa aaa gga tta aag aat gta ttt gat gaa gct att tta gct gct			528
Thr Gln Lys Gly Leu Lys Asn Val Phe Asp Glu Ala Ile Leu Ala Ala			
165	170	175	
tta gag cca ccg gag cct aaa aga cgt cgc cga tgt caa att ttg			573
Leu Glu Pro Pro Glu Pro Lys Arg Arg Arg Cys Gln Ile Leu			
180	185	190	
tga			576

<210> 160
 <211> 191
 <212> PRT
 <213> Ciona savignyi

<400> 160
 Met Gln Thr Ile Lys Cys Val Val Val Gly Asp Gly Ala Val Gly Lys
 1 5 10 15
 Thr Cys Leu Leu Ile Ser Tyr Thr Thr Asn Lys Phe Pro Gln Glu Tyr
 20 25 30
 Val Pro Thr Val Phe Asp Asn Tyr Ala Val Thr Val Met Ile Gly Gly
 35 40 45
 Glu Pro Tyr Thr Leu Gly Leu Phe Asp Thr Ala Gly Gln Glu Asp Tyr
 50 55 60
 Asp Arg Leu Arg Pro Leu Ser Tyr Pro Gln Thr Asp Val Phe Leu Val
 65 70 75 80
 Cys Phe Ser Val Val Ser Pro Ser Ser Tyr Glu Asn Ile Lys Glu Lys
 85 90 95
 Trp Val Pro Glu Ile Thr His His Cys Pro Lys Thr Pro Phe Leu Leu
 100 105 110
 Val Gly Thr Gln Val Asp Leu Arg Asp Asp Ala Ala Thr Ile Glu Lys
 115 120 125
 Leu Ser Lys Asn Lys Gln Lys Ala Ile Thr Pro Asp Leu Gly Asp Lys
 130 135 140
 Leu Ala Arg Glu Leu Lys Ala Val Lys Tyr Val Glu Cys Ser Ala Leu
 145 150 155 160
 Thr Gln Lys Gly Leu Lys Asn Val Phe Asp Glu Ala Ile Leu Ala Ala
 165 170 175
 Leu Glu Pro Pro Glu Pro Lys Arg Arg Arg Arg Cys Gln Ile Leu
 180 185 190

<210> 161
 <211> 757
 <212> DNA
 <213> Cryptococcus neoformans

<220>
 <221> CDS
 <222> (9)..(602)

<400> 161
 cacacacc atg tcc gga gaa atc agg aga aag ctc gtt att gtc ggc gac 50
 Met Ser Gly Glu Ile Arg Arg Lys Leu Val Ile Val Gly Asp
 1 5 10
 ggt gct tgt ggt aag aca tgt ctt ctt atc gtg ttc agc aag ggc atg 98
 Gly Ala Cys Gly Lys Thr Cys Leu Leu Ile Val Phe Ser Lys Gly Met
 15 20 25 30
 ttc ccc gag gtg tac gtg ccc acc gtc ttt gaa aac tat gtc gcc gat 146
 Phe Pro Glu Val Tyr Val Pro Thr Val Phe Glu Asn Tyr Val Ala Asp
 35 40 45

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gta gag gtg gac ggg aag aag gtc gag ctg gcg ttg tgg gat act gct 194
 Val Glu Val Asp Gly Lys Lys Val Glu Leu Ala Leu Trp Asp Thr Ala
 50 55 60
 gga cag gag gac tat gac cga ctc cga cct ctt tct tac ccc gac tcc 242
 Gly Gln Glu Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Asp Ser
 65 70 75
 cat gtc att ctc atc tgt ttc gct att gac tcc ccc gac tcg ctt gac 290
 His Val Ile Leu Ile Cys Phe Ala Ile Asp Ser Pro Asp Ser Leu Asp
 80 85 90
 aat gtt caa gaa aag tgg att tcc gag gtc ctt cac ttc tgt cag ggt 338
 Asn Val Gln Glu Lys Trp Ile Ser Glu Val Leu His Phe Cys Gln Gly
 95 100 105 110
 ctc ccc atc gtc ctc gtg gcg tgc aag aag gat ctc cgc gac gat ggc 386
 Leu Pro Ile Val Leu Val Ala Cys Lys Lys Asp Leu Arg Asp Asp Gly
 115 120 125
 aag act atc cag gac ctt gcc agg atg aac cag agg cct gtt tcc cgg 434
 Lys Thr Ile Gln Asp Leu Ala Arg Met Asn Gln Arg Pro Val Ser Arg
 130 135 140
 gcc gag ggt atg gcc gtt gcc caa aag att ggg gcg cag ggc tac gtc 482
 Ala Glu Gly Met Ala Val Ala Gln Lys Ile Gly Ala Gln Gly Tyr Val
 145 150 155
 gag tgc agt gcc aag acg ggc gag ggt gtc agg gaa gtg ttc cag act 530
 Glu Cys Ser Ala Lys Thr Gly Glu Gly Val Arg Glu Val Phe Gln Thr
 160 165 170
 gct acc agg cat gct ctc cag agc aaa aag tcc aag tct ggc aga ggg 578
 Ala Thr Arg His Ala Leu Gln Ser Lys Lys Ser Lys Ser Gly Arg Gly
 175 180 185 190
 aag aag ggt tgt gtg gtg ctt tagggctcta taaatcgagt tgtactttat 629
 Lys Lys Gly Cys Val Val Leu
 195
 cttgttcgtc gctggcgtct ttatacctct ttctcttcac gccattctca cgccttggcc 689
 caagtgtttg gggcttattc tctcttttac ttgctgtgat ttgatgaatc gatgagtagt 749
 tatgccccg 757

<210> 162

<211> 197

<212> PRT

<213> *Cryptococcus neoformans*

<400> 162

Met Ser Gly Glu Ile Arg Arg Lys Leu Val Ile Val Gly Asp Gly Ala
 1 5 10 15
 Cys Gly Lys Thr Cys Leu Leu Ile Val Phe Ser Lys Gly Met Phe Pro
 20 25 30
 Glu Val Tyr Val Pro Thr Val Phe Glu Asn Tyr Val Ala Asp Val Glu
 35 40 45
 Val Asp Gly Lys Lys Val Glu Leu Ala Leu Trp Asp Thr Ala Gly Gln
 50 55 60
 Glu Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Asp Ser His Val
 65 70 75 80
 Ile Leu Ile Cys Phe Ala Ile Asp Ser Pro Asp Ser Leu Asp Asn Val
 85 90 95
 Gln Glu Lys Trp Ile Ser Glu Val Leu His Phe Cys Gln Gly Leu Pro
 100 105 110
 Ile Val Leu Val Ala Cys Lys Lys Asp Leu Arg Asp Asp Gly Lys Thr
 115 120 125
 Ile Gln Asp Leu Ala Arg Met Asn Gln Arg Pro Val Ser Arg Ala Glu
 130 135 140
 Gly Met Ala Val Ala Gln Lys Ile Gly Ala Gln Gly Tyr Val Glu Cys
 145 150 155 160
 Ser Ala Lys Thr Gly Glu Gly Val Arg Glu Val Phe Gln Thr Ala Thr

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165
 Arg His Ala Leu Gln Ser Lys Lys Ser Lys Ser Gly Arg Gly Lys Lys
 180
 Gly Cys Val Val Leu
 195

<210> 163
 <211> 626
 <212> DNA
 <213> Gallus gallus

<220>
 <221> CDS
 <222> (27)..(605)

<400> 163
 tctcggcggc ggcgccatcgc gggcag atg cag gcg atc aag tgt gtg gtg gtg 53
 Met Gln Ala Ile Lys Cys Val Val Val
 1 5
 ggc gac gga gct gta ggg aag acc tgc ttg ctg atc agt tac acc acg 101
 Gly Asp Gly Ala Val Gly Lys Thr Cys Leu Leu Ile Ser Tyr Thr Thr
 10 15 20 25
 aat gcc ttt cct gga gag tac atc ccc act gta ttt gat aac tat tct 149
 Asn Ala Phe Pro Gly Glu Tyr Ile Pro Thr Val Phe Asp Asn Tyr Ser
 30 35 40
 gcc aat gtc atg gta gat ggg aag cca gtg aat cta ggc ctc tgg gat 197
 Ala Asn Val Met Val Asp Gly Lys Pro Val Asn Leu Gly Leu Trp Asp
 45 50 55
 aca gca gga caa gag gat tat gac cga ctg cgg cct ctt tcc tac cca 245
 Thr Ala Gly Gln Glu Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro
 60 65 70
 cag aca gat gtt ttc ttg att tgc ttc tcc ctg agt cca gcc tcc 293
 Gln Thr Asp Val Phe Leu Ile Cys Phe Ser Leu Val Ser Pro Ala Ser
 75 80 85
 ttt gag aat gtc aga gcc aag tgg tac cct gag gtc cga cac cac tgc 341
 Phe Glu Asn Val Arg Ala Lys Trp Tyr Pro Glu Val Arg His His Cys
 90 95 100 105
 cca aat aca cct atc atc ttg gtg ggc acc aag ctg gac tta agg gat 389
 Pro Asn Thr Pro Ile Ile Leu Val Gly Thr Lys Leu Asp Leu Arg Asp
 110 115 120
 gat aag gac acc att gaa agg tta cgt gat aag aaa ctg gct ccc atc 437
 Asp Lys Asp Thr Ile Glu Arg Leu Arg Asp Lys Lys Leu Ala Pro Ile
 125 130 135
 acc tac ccc caa ggt ttg gcc atg gct cgg gag att ggc tcg gta aag 485
 Thr Tyr Pro Gln Gly Leu Ala Met Ala Arg Glu Ile Gly Ser Val Lys
 140 145 150
 tac ctt gag tgc tct gcc ctg aca cag cgg ggc ttg aag acg gtg ttt 533
 Tyr Leu Glu Cys Ser Ala Thr Gln Arg Gly Leu Lys Thr Val Phe
 155 160 165
 gat gaa gcc atc cgg gct gtg ctc tgc cca ccg ccc gtg aag aag cct 581
 Asp Glu Ala Ile Arg Ala Val Leu Cys Pro Pro Pro Val Lys Lys Pro
 170 175 180 185
 ggc aaa aag tgc acc gtg ttc tgagggctgt ggcctaggtg ctgg 626
 Gly Lys Lys Cys Thr Val Phe
 190

<210> 164
 <211> 192
 <212> PRT
 <213> Gallus gallus

<400> 164
 Met Gln Ala Ile Lys Cys Val Val Val Gly Asp Gly Ala Val Gly Lys
 1 5 10 15
 Thr Cys Leu Leu Ile Ser Tyr Thr Thr Asn Ala Phe Pro Gly Glu Tyr
 20 25 30
 Ile Pro Thr Val Phe Asp Asn Tyr Ser Ala Asn Val Met Val Asp Gly

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35	40	45																	
Lys	Pro	Val	Asn	Leu	Gly	Leu	Trp	Asp	Thr	Ala	Gly	Gln	Glu	Asp	Tyr				
50						55					60								
Asp	Arg	Leu	Arg	Pro	Leu	Ser	Tyr	Pro	Gln	Thr	Asp	Val	Phe	Leu	Ile				
65					70					75					80				
Cys	Phe	Ser	Leu	Val	Ser	Pro	Ala	Ser	Phe	Glu	Asn	Val	Arg	Ala	Lys				
				85					90					95					
Trp	Tyr	Pro	Glu	Val	Arg	His	His	Cys	Pro	Asn	Thr	Pro	Ile	Ile	Leu				
			100					105					110						
Val	Gly	Thr	Lys	Leu	Asp	Leu	Arg	Asp	Asp	Lys	Asp	Thr	Ile	Glu	Arg				
			115					120					125						
Leu	Arg	Asp	Lys	Lys	Leu	Ala	Pro	Ile	Thr	Tyr	Pro	Gln	Gly	Leu	Ala				
			130			135					140								
Met	Ala	Arg	Glu	Ile	Gly	Ser	Val	Lys	Tyr	Leu	Glu	Cys	Ser	Ala	Leu				
145					150					155					160				
Thr	Gln	Arg	Gly	Leu	Lys	Thr	Val	Phe	Asp	Glu	Ala	Ile	Arg	Ala	Val				
				165					170					175					
Leu	Cys	Pro	Pro	Pro	Val	Lys	Lys	Pro	Gly	Lys	Lys	Cys	Thr	Val	Phe				
			180					185					190						

<210> 165

<211> 731

<212> DNA

<213> Gallus gallus

<220>

<221> CDS

<222> (48)..(638)

<400> 165

cggccatcgt	cctgctgcac	ggcaaggcca	gcttggcgag	cctgggcc	atg gcc gcc	56
					Met Ala Ala	
					1	
atc cgc aag aag ctg gtg gtg gga gac ggc gcc tgt ggc aag acc						104
Ile Arg Lys Lys Leu Val Val Val Gly Asp Gly Ala Cys Gly Lys Thr						
5	10			15		
tgc ctc ctc atc gtc ttc agc aag gac gag ttc ccc gag gtt tac gtg						152
Cys Leu Leu Ile Val Phe Ser Lys Asp Glu Phe Pro Glu Val Tyr Val						
20	25		30		35	
ccc acc gtc ttt gag aac tac gtg gcc gac atc gag gtg gac ggc aag						200
Pro Thr Val Phe	40	45			50	
cag gtg gag ctg gcg ctg tgg gac acg gcc ggc cag gag gac tac gac						248
Gln Val Glu Leu Ala Leu Trp Asp Thr Ala Gly Gln Glu Asp Tyr Asp						
55	60			65		
cgc ctg cgc cct ctc tcc tac cca gac acg gac gtg atc ctc atg tgc						296
Arg Leu Arg Pro Leu Ser Tyr Pro Asp Thr Asp Val Ile Leu Met Cys						
70	75			80		
ttc tca gtg gac agc ccg gac tgc ctg gag aac atc ccg gag aag tgg						344
Phe Ser Val Asp Ser Pro Asp Ser Leu Glu Asn Ile Pro Glu Lys Trp						
85	90			95		
gtg ccc gaa gtc aag cac ttc tgc ccc aac gtc ccc atc atc ctg gtg						392
Val Pro Glu Val Lys His Phe Cys Pro Asn Val Pro Ile Ile Leu Val						
100	105			110		115
gcc aac aag aaa gac ctg cgc aac gac gag cac gtg cgt aac gag ctg						440
Ala Asn Lys Lys Asp Leu Arg Asn Asp Glu His Val Arg Asn Glu Leu						
120	125			130		
gcc cgc atg aag cag gag ccg gtg cgc act gag gat ggc cgc gcc atg						488
Ala Arg Met Lys Gln Glu Pro Val Arg Thr Glu Asp Gly Arg Ala Met						
135	140			145		
gcc atc cgc atc cag gcc tac gac tac ctg gag tgc tgc gcc aag acc						536
Ala Ile Arg Ile Gln Ala Tyr Asp Tyr Leu Glu Cys Ser Ala Lys Thr						
150	155			160		
aag gag ggt gtg cgg gag gtc ttt gag acg gcc acc cgg gcg gcc ttg						584
Lys Glu Gly Val Arg Glu Val Phe Glu Thr Ala Thr Arg Ala Ala Leu						
165	170			175		
cag aag cgc tac ggc act cag aac ggc tgc atc aat tgc tgc aag gtc						632
Gln Lys Arg Tyr Gly Thr Gln Asn Gly Cys Ile Asn Cys Cys Lys Val						

180 185 190 195 685
 cta tagggcccggt ctggagccgg cgctgggcac ggctctgggt cacctgttgg
 Leu
 caggcggaga ggagctgggg cacgcatgca cacagcatct gcctgt 731

<210> 166
 <211> 196
 <212> PRT
 <213> Gallus gallus

<400> 166
 Met Ala Ala Ile Arg Lys Lys Leu Val Val Val Gly Asp Gly Ala Cys
 1 5 10 15
 Gly Lys Thr Cys Leu Leu Ile Val Phe Ser Lys Asp Glu Phe Pro Glu
 20 25 30
 Val Tyr Val Pro Thr Val Phe Glu Asn Tyr Val Ala Asp Ile Glu Val
 35 40 45
 Asp Gly Lys Gln Val Glu Leu Ala Leu Trp Asp Thr Ala Gly Gln Glu
 50 55 60
 Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Asp Thr Asp Val Ile
 65 70 75 80
 Leu Met Cys Phe Ser Val Asp Ser Pro Asp Ser Leu Glu Asn Ile Pro
 85 90 95
 Glu Lys Trp Val Pro Glu Val Lys His Phe Cys Pro Asn Val Pro Ile
 100 105 110
 Ile Leu Val Ala Asn Lys Lys Asp Leu Arg Asn Asp Glu His Val Arg
 115 120 125
 Asn Glu Leu Ala Arg Met Lys Gln Glu Pro Val Arg Thr Glu Asp Gly
 130 135 140
 Arg Ala Met Ala Ile Arg Ile Gln Ala Tyr Asp Tyr Leu Glu Cys Ser
 145 150 155 160
 Ala Lys Thr Lys Glu Gly Val Arg Glu Val Phe Glu Thr Ala Thr Arg
 165 170 175
 Ala Ala Leu Gln Lys Arg Tyr Gly Thr Gln Asn Gly Cys Ile Asn Cys
 180 185 190
 Cys Lys Val Leu
 195

<210> 167
 <211> 883
 <212> DNA
 <213> Hemicentrotus pulcherrimus

<220>
 <221> CDS
 <222> (61)..(639)

<400> 167
 cgggtgtaat ctgcctcttc ctggtactat tttatgaaat ttgtgtgaaa acctaagaca 60
 atg gct gct ata agg aaa aag ttg gtt atc gta gga gat ggt gct tgt 108
 Met Ala Ala Ile Arg Lys Lys Leu Val Ile Val Gly Asp Gly Ala Cys
 1 5 10 15
 ggg aag acg tgt ctg ctc ata gta ttt agc aaa gac cag ttc cct gaa 156
 Gly Lys Thr Cys Leu Leu Ile Val Phe Ser Lys Asp Gln Phe Pro Glu
 20 25 30
 gtc tat gtc cca aca gtt ttt gag aac tat gta gct gat ata gaa gta 204
 Val Tyr Val Pro Thr Val Phe Glu Asn Tyr Val Ala Asp Ile Glu Val
 35 40 45
 gac ggt aaa cag gtt gag ttg gca tta tgg gat aca gca ggt cag gaa 252
 Asp Gly Lys Gln Val Glu Leu Ala Leu Trp Asp Thr Ala Gly Gln Glu
 50 55 60
 gac tac gac aga ctg aga ccg ctc tca tat cca gac aca gac gtt ata 300

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Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Asp Thr Asp Val Ile
65      70      75      80
ctc atg tgc ttt tca atc gac aac cca gac agt tta gaa acc atc cca      348
Leu Met Cys Phe Ser Ile Asp Asn Pro Asp Ser Leu Glu Thr Ile Pro
      85      90      95
gaa aaa tgg aca cca gag gtg aag cac ttt tgc cct aat gta cct gtc      396
Glu Lys Trp Thr Pro Glu Val Lys His Phe Cys Pro Asn Val Pro Val
      100      105      110
atc ttg gtc ggc aac aag aaa gat ctt cga aat gac gat gcc aca aaa      444
Ile Leu Val Gly Asn Lys Lys Asp Leu Arg Asn Asp Asp Ala Thr Lys
      115      120      125
cgg gaa ctg agt aag atg aag cag gaa ccg gtg aaa tat aat gat gcc      492
Arg Glu Leu Ser Lys Met Lys Gln Glu Pro Val Lys Tyr Asn Asp Ala
      130      135      140
cag acc atg tca gat aag atc aac gcc tac aaa tac cta gaa tgc tca      540
Gln Thr Met Ser Asp Lys Ile Asn Ala Tyr Lys Tyr Leu Glu Cys Ser
      145      150      155
gcc aag tct aac gat ggt gtc agg gaa gtg ttt gag aca gca acc aga      588
Ala Lys Ser Asn Asp Gly Val Arg Glu Val Phe Glu Thr Ala Thr Arg
      165      170      175
gca gca cta caa gtt aaa aag aag aag tca tca aaa tgc agc ctc ttg      636
Ala Ala Leu Gln Val Lys Lys Lys Ser Ser Lys Cys Ser Leu Leu
      180      185      190
taagagaagt cttcatgcaa gctggcaagg catggtagtg gtcaacaaga ggtcctcaaa      696

gaataatgca tttaatatac atgtatgtgt ttggggaaaa gagcgattat gtaatatttc      756

tgyatgtgct ttgaagggtca aagacagcgg tagtgccagc atactttgtt taattgctgt      816

tgtgataata agaggcaatc ggcttaattt tgtagttgca gatttacgaa accacttttc      876

tttctttt      883

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<210> 168

<211> 192

<212> PRT

<213> Hemicentrotus pulcherrimus

<400> 168

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Met Ala Ala Ile Arg Lys Lys Leu Val Ile Val Gly Asp Gly Ala Cys
1      5      10      15
Gly Lys Thr Cys Leu Leu Ile Val Phe Ser Lys Asp Gln Phe Pro Glu
      20      25      30
Val Tyr Val Pro Thr Val Phe Glu Asn Tyr Val Ala Asp Ile Glu Val
      35      40      45
Asp Gly Lys Gln Val Glu Leu Ala Leu Trp Asp Thr Ala Gly Gln Glu
      50      55      60
Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Asp Thr Asp Val Ile
65      70      75      80
Leu Met Cys Phe Ser Ile Asp Asn Pro Asp Ser Leu Glu Thr Ile Pro
      85      90      95
Glu Lys Trp Thr Pro Glu Val Lys His Phe Cys Pro Asn Val Pro Val
      100      105      110
Ile Leu Val Gly Asn Lys Lys Asp Leu Arg Asn Asp Asp Ala Thr Lys
      115      120      125
Arg Glu Leu Ser Lys Met Lys Gln Glu Pro Val Lys Tyr Asn Asp Ala
      130      135      140
Gln Thr Met Ser Asp Lys Ile Asn Ala Tyr Lys Tyr Leu Glu Cys Ser
      145      150      155      160
Ala Lys Ser Asn Asp Gly Val Arg Glu Val Phe Glu Thr Ala Thr Arg
      165      170      175

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Ala Ala Leu Gln Val Lys Lys Lys Lys Ser Ser Lys Cys Ser Leu Leu
 180 185 190

<210> 169

<211> 958

<212> DNA

<213> Arabidopsis thaliana

<220>

<221> CDS

<222> (146)..(742)

<400> 169

gtcgacccac gcgtccggag agactttcag cagctatttc tttgtcttct ttctctataa 60

agaacctcac tctctctctc tttagtcaaa aatccccaat tcgtgaacaa attagggttt 120

ttgaagtttg aagaaggaga gaaag atg agt gct tca agg ttt atc aag tgt 172

Met Ser Ala Ser Arg Phe Ile Lys Cys
1 5

gtc act gtc ggc gac ggt gct gtt gga aag act tgt ctt ctc atc tcc 220

Val Thr Val Gly Asp Gly Ala Val Gly Lys Thr Cys Leu Leu Ile Ser
10 15 20 25

tac act agc aac act ttc ccc acg gat tat gtg cca act gtg ttc gat 268

Tyr Thr Ser Asn Thr Phe Pro Thr Asp Tyr Val Pro Thr Val Phe Asp
30 35 40

aat ttc agt gcc aat gtg att gtt gat ggc aac act atc aac ttg gga 316

Asn Phe Ser Ala Asn Val Ile Val Asp Gly Asn Thr Ile Asn Leu Gly
45 50 55

ttg tgg gat act gca ggg caa gag gac tac aat aga cta aga cct ttg 364

Leu Trp Asp Thr Ala Gly Gln Glu Asp Tyr Asn Arg Leu Arg Pro Leu
60 65 70

agc tat cgc ggt gca gat gtc ttc tta ctt gca ttc tca ctt gtc agc 412

Ser Tyr Arg Gly Ala Asp Val Phe Leu Leu Ala Phe Ser Leu Val Ser
75 80 85

aaa gct agc tat gaa aat gtt tct aaa aag tgg gtt cct gaa ctg aga 460

Lys Ala Ser Tyr Glu Asn Val Ser Lys Lys Trp Val Pro Glu Leu Arg
90 95 100 105

cat tat gct cct ggt gtt ccc atc atc ctc gtt gga aca aag ctt gat 508

His Tyr Ala Pro Gly Val Pro Ile Ile Leu Val Gly Thr Lys Leu Asp
110 115 120

ctt cga cat gat aag caa ttc ttt gcc gag cac cct ggt gct gtg cct 556

Leu Arg His Asp Lys Gln Phe Phe Ala Glu His Pro Gly Ala Val Pro
125 130 135

atc tct acc gct cag ggt gaa gaa cta aag aag ctg att ggg gcg cct 604

Ile Ser Thr Ala Gln Gly Glu Glu Leu Lys Lys Leu Ile Gly Ala Pro
140 145 150

gct tat atc gaa tgc agt gca aaa act caa cag aat gtg aaa gca gtg 652

Ala Tyr Ile Glu Cys Ser Ala Lys Thr Gln Gln Asn Val Lys Ala Val
155 160 165

ttt gat gcg gct atc aag gtc gtt ctc cag cca aaa aac aag aag 700

Phe Asp Ala Ala Ile Lys Val Val Leu Gln Pro Pro Lys Asn Lys Lys
170 175 180 185

aag aag aag aga aaa tct cag aaa ggt tgt tct ata ctc tgattcaaca 749

Lys Lys Lys Arg Lys Ser Gln Lys Gly Cys Ser Ile Leu

190

195

agaagaaagg aatcaacagg agaattagag ctataagtat ttgttttctc ctttttcata 809

acttgtttac ccaaggaatc aaaaatctgt tgtttgtagt ctgaaaatga caaaagttga 869

agaactagta acaagtatctt gtattcttctg ttgcattttg atctgtaaat ataccacgaa 929

tccttgattt ctctgtttcc taataaaaaa 958

<210> 170
 <211> 198
 <212> PRT
 <213> Arabidopsis thaliana

<400> 170
 Met Ser Ala Ser Arg Phe Ile Lys Cys Val Thr Val Gly Asp Gly Ala
 1 5 10 15
 Val Gly Lys Thr Cys Leu Leu Ile Ser Tyr Thr Ser Asn Thr Phe Pro
 20 25 30
 Thr Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val Ile
 35 40 45
 Val Asp Gly Asn Thr Ile Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln
 50 55 60
 Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp Val
 65 70 75 80
 Phe Leu Leu Ala Phe Ser Leu Val Ser Lys Ala Ser Tyr Glu Asn Val
 85 90 95
 Ser Lys Lys Trp Val Pro Glu Leu Arg His Tyr Ala Pro Gly Val Pro
 100 105 110
 Ile Ile Leu Val Gly Thr Lys Leu Asp Leu Arg His Asp Lys Gln Phe
 115 120 125
 Phe Ala Glu His Pro Gly Ala Val Pro Ile Ser Thr Ala Gln Gly Glu
 130 135 140
 Glu Leu Lys Lys Leu Ile Gly Ala Pro Ala Tyr Ile Glu Cys Ser Ala
 145 150 155 160
 Lys Thr Gln Gln Asn Val Lys Ala Val Phe Asp Ala Ala Ile Lys Val
 165 170 175
 Val Leu Gln Pro Pro Lys Asn Lys Lys Lys Lys Arg Lys Ser Gln
 180 185 190
 Lys Gly Cys Ser Ile Leu
 195

<210> 171
 <211> 780
 <212> DNA
 <213> Anopheles gambiae str

<220>
 <221> CDS
 <222> (208)..(780)

<400> 171
 gcggccgcaa aagcaaatga aaagttgaac tgaaacttcc aagcgcacaa agtcgagccg 60
 tgaggtggtt tccttggttt tccgtgttcg agtgtgtgtg tgggtggttct gtgtttcgta 120
 cgtgtgcggt gcgcgtttgt gttggaggtg tttcggtttg tattttcttc gtgtttccag 180
 tttgtttttc ctagggtttc ctaaaaag atg tca tcc gga aga cct atc aaa tgt 234
 Met Ser Ser Gly Arg Pro Ile Lys Cys
 1 5
 gtg gtg gtc ggc gac ggc acg gtg ggg aag acg tgc atg ttg atc agc 282
 Val Val Val Gly Asp Gly Thr Val Gly Lys Thr Cys Met Leu Ile Ser
 10 15 20 25
 tac acg acc gac agc ttt ccc ggc gaa tac gta ccc acg gtc ttc gac 330
 Tyr Thr Thr Asp Ser Phe Pro Gly Glu Tyr Val Pro Thr Val Phe Asp
 30 35 40
 aac tac tcc gcc ccg atg gtg gtg gac ggt gtg caa gtg tcg ctc ggg 378
 Asn Tyr Ser Ala Pro Met Val Val Asp Gly Val Gln Val Ser Leu Gly
 45 50 55

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ctg	tgg	gat	acg	gcc	ggg	cag	gaa	gac	tac	gat	cgg	cta	agg	ccc	ctg	426
Leu	Trp	Asp	Thr	Ala	Gly	Gln	Glu	Asp	Tyr	Asp	Arg	Leu	Arg	Pro	Leu	
	60						65				70					
tcc	tac	cca	cag	acg	gac	gtg	ttc	ctc	ata	tgc	tac	agt	gtg	gcc	agc	474
Ser	Tyr	Pro	Gln	Thr	Asp	Val	Phe	Leu	Ile	Cys	Tyr	Ser	Val	Ala	Ser	
	75					80					85					
ccg	tcg	tcg	ttc	gaa	aac	gtt	acc	tcc	aaa	tgg	tat	ccc	gag	atc	aag	522
Pro	Ser	Ser	Phe	Glu	Asn	Val	Thr	Ser	Lys	Trp	Tyr	Pro	Glu	Ile	Lys	
	90			95						100					105	
cac	cac	tgc	ccg	gat	gcg	ccc	atc	att	tta	gtc	gga	acc	aaa	atc	gat	570
His	His	Cys	Pro	Asp	Ala	Pro	Ile	Ile	Leu	Val	Gly	Thr	Lys	Ile	Asp	
			110						115					120		
ctg	cgc	gag	gat	cgg	gaa	acg	ata	agc	ttg	ctg	gcg	gac	cag	ggc	ctt	618
Leu	Arg	Glu	Asp	Arg	Glu	Thr	Ile	Ser	Leu	Leu	Ala	Asp	Gln	Gly	Leu	
			125						130					135		
tcc	gcg	ctg	aag	cgc	gaa	cag	ggc	caa	aag	cta	gcg	aac	aag	ata	cgg	666
Ser	Ala	Leu	Lys	Arg	Glu	Gln	Gly	Gln	Lys	Leu	Ala	Asn	Lys	Ile	Arg	
		140					145					150				
gcg	gta	aag	tat	atg	gaa	tgt	tcg	gca	cta	acc	cag	cgg	ggc	cta	aag	714
Ala	Val	Lys	Tyr	Met	Glu	Cys	Ser	Ala	Leu	Thr	Gln	Arg	Gly	Leu	Lys	
	155					160					165					
cag	gtg	ttt	gac	gaa	gcg	ctt	tgc	gcc	acg	gaa	gag	aaa	gag	cga	atg	762
Gln	Val	Phe	Asp	Glu	Ala	Leu	Cys	Ala	Thr	Glu	Glu	Lys	Glu	Arg	Met	
	170					175				180					185	
ccg	gta	gaa	gag	gag	tag											780
Pro	Val	Glu	Glu	Glu												
				190												

<210> 172

<211> 190

<212> PRT

<213> Anopheles gambiae str

<400> 172

Met	Ser	Ser	Gly	Arg	Pro	Ile	Lys	Cys	Val	Val	Val	Gly	Asp	Gly	Thr	
1			5						10					15		
Val	Gly	Lys	Thr	Cys	Met	Leu	Ile	Ser	Tyr	Thr	Thr	Asp	Ser	Phe	Pro	
			20					25					30			
Gly	Glu	Tyr	Val	Pro	Thr	Val	Phe	Asp	Asn	Tyr	Ser	Ala	Pro	Met	Val	
		35					40					45				
Val	Asp	Gly	Val	Gln	Val	Ser	Leu	Gly	Leu	Trp	Asp	Thr	Ala	Gly	Gln	
	50					55					60					
Glu	Asp	Tyr	Asp	Arg	Leu	Arg	Pro	Leu	Ser	Tyr	Pro	Gln	Thr	Asp	Val	
	65				70					75					80	
Phe	Leu	Ile	Cys	Tyr	Ser	Val	Ala	Ser	Pro	Ser	Ser	Phe	Glu	Asn	Val	
			85						90					95		
Thr	Ser	Lys	Trp	Tyr	Pro	Glu	Ile	Lys	His	His	Cys	Pro	Asp	Ala	Pro	
		100						105						110		
Ile	Ile	Leu	Val	Gly	Thr	Lys	Ile	Asp	Leu	Arg	Glu	Asp	Arg	Glu	Thr	
		115				120						125				
Ile	Ser	Leu	Leu	Ala	Asp	Gln	Gly	Leu	Ser	Ala	Leu	Lys	Arg	Glu	Gln	
	130					135					140					
Gly	Gln	Lys	Leu	Ala	Asn	Lys	Ile	Arg	Ala	Val	Lys	Tyr	Met	Glu	Cys	
	145				150					155					160	
Ser	Ala	Leu	Thr	Gln	Arg	Gly	Leu	Lys	Gln	Val	Phe	Asp	Glu	Ala	Leu	
			165						170					175		
Cys	Ala	Thr	Glu	Glu	Lys	Glu	Arg	Met	Pro	Val	Glu	Glu	Glu			
			180					185					190			

<210> 173

<211> 657

<212> DNA

<213> Giardia lamblia ATCC 50803

<220>

<221> CDS

<222> (1)..(657)

<400> 173
 atg act agt aca gga aat gag gat aca gcg ggt gca agg atg ata cat 48
 Met Thr Ser Thr Gly Asn Glu Asp Thr Ala Gly Ala Arg Met Ile His
 1 5 10 15
 atc aaa gcc gta gtg gtt gga gac ggc tca gtg ggc aag acc tgc ctt 96
 Ile Lys Ala Val Val Val Gly Asp Gly Ser Val Gly Lys Thr Cys Leu
 20 25 30
 ctt ttt gtc tat gcg aat aac tca ttt cca gag gac tac ttg cca aca 144
 Leu Phe Val Tyr Ala Asn Asn Ser Phe Pro Glu Asp Tyr Leu Pro Thr
 35 40 45
 gtc ttt gac aac tat tct gcc aac gtc gtt gtt gac aac ttg acg ata 192
 Val Phe Asp Asn Tyr Ser Ala Asn Val Val Val Asp Asn Leu Thr Ile
 50 55 60
 aat att ggt ctc tgg gat act gcg ggc cag gag gat tac gac aaa ttg 240
 Asn Ile Gly Leu Trp Asp Thr Ala Gly Gln Glu Asp Tyr Asp Lys Leu
 65 70 75 80
 cga ccc ttg agc tat cca ggg gcg cac gta ttt ttg ctc tgc ttt agc 288
 Arg Pro Leu Ser Tyr Pro Gly Ala His Val Phe Leu Leu Cys Phe Ser
 85 90 95
 gtc gtt tcc agc act tcg ttt gca aac atc aga tcc aaa tgg tac aca 336
 Val Val Ser Ser Thr Ser Phe Ala Asn Ile Arg Ser Lys Trp Tyr Thr
 100 105 110
 gag gtc aag gag tac tgt cca aac gtg ccg atg atc ctt gtc gga aca 384
 Glu Val Lys Glu Tyr Cys Pro Asn Val Pro Met Ile Leu Val Gly Thr
 115 120 125
 aag tat gac ctg ctg tcc gac gag gct tac ctg gcc aag atg aaa gag 432
 Lys Tyr Asp Leu Leu Ser Asp Glu Ala Tyr Leu Ala Lys Met Lys Glu
 130 135 140
 aag aac caa tcc ccg gtg tct gat gaa cgt gca gag gaa gtt gca aaa 480
 Lys Asn Gln Ser Pro Val Ser Asp Glu Arg Ala Glu Glu Val Ala Lys
 145 150 155 160
 gag ata aag gcc att aag tac att agc tgc agt gcc cga tgc caa ctt 528
 Glu Ile Lys Ala Ile Lys Tyr Ile Ser Cys Ser Ala Arg Cys Gln Leu
 165 170 175
 cgc gta aag gac gtg ttt gat agt gca atc cgc gcg gct ctc aag aat 576
 Arg Val Lys Asp Val Phe Asp Ser Ala Ile Arg Ala Ala Leu Lys Asn
 180 185 190
 atg ggg atg atg ggt agt ggg act tcc aag gca gga aag aaa aag gat 624
 Met Gly Met Met Gly Ser Gly Thr Ser Lys Ala Gly Lys Lys Asp
 195 200 205
 gga tct gga aag gga aag tgt gtt ata ttc tag 657
 Gly Ser Gly Lys Gly Lys Cys Val Ile Phe
 210 215

<210> 174

<211> 218

<212> PRT

<213> Giardia lamblia ATCC 50803

<400> 174

Met Thr Ser Thr Gly Asn Glu Asp Thr Ala Gly Ala Arg Met Ile His
 1 5 10 15
 Ile Lys Ala Val Val Val Gly Asp Gly Ser Val Gly Lys Thr Cys Leu
 20 25 30
 Leu Phe Val Tyr Ala Asn Asn Ser Phe Pro Glu Asp Tyr Leu Pro Thr
 35 40 45
 Val Phe Asp Asn Tyr Ser Ala Asn Val Val Val Asp Asn Leu Thr Ile
 50 55 60
 Asn Ile Gly Leu Trp Asp Thr Ala Gly Gln Glu Asp Tyr Asp Lys Leu
 65 70 75 80
 Arg Pro Leu Ser Tyr Pro Gly Ala His Val Phe Leu Leu Cys Phe Ser
 85 90 95
 Val Val Ser Ser Thr Ser Phe Ala Asn Ile Arg Ser Lys Trp Tyr Thr
 100 105 110
 Glu Val Lys Glu Tyr Cys Pro Asn Val Pro Met Ile Leu Val Gly Thr
 115 120 125

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Lys Tyr Asp Leu Leu Ser Asp Glu Ala Tyr Leu Ala Lys Met Lys Glu
 130 135 140
 Lys Asn Gln Ser Pro Val Ser Asp Glu Arg Ala Glu Glu Val Ala Lys
 145 150 155 160
 Glu Ile Lys Ala Ile Lys Tyr Ile Ser Cys Ser Ala Arg Cys Gln Leu
 165 170 175
 Arg Val Lys Asp Val Phe Asp Ser Ala Ile Arg Ala Ala Leu Lys Asn
 180 185 190
 Met Gly Met Met Gly Ser Gly Thr Ser Lys Ala Gly Lys Lys Asp
 195 200 205
 Gly Ser Gly Lys Gly Lys Cys Val Ile Phe
 210 215

<210> 175

<211> 624

<212> DNA

<213> Neurospora crassa

<220>

<221> CDS

<222> (1) .. (624)

<400> 175

atg	gtg	acg	gga	act	atc	aag	tat	gcc	aaa	aca	aac	cac	ccc	tta	tcg	48
Met	Val	Thr	Gly	Thr	Ile	Lys	Tyr	Ala	Lys	Thr	Asn	His	Pro	Leu	Ser	
1			5					10						15		
aga	gag	tgc	gta	gtc	gtc	ggt	gac	ggt	gcc	gtt	gga	aag	aca	tgt	ctc	96
Arg	Glu	Cys	Val	Val	Val	Gly	Asp	Gly	Ala	Val	Gly	Lys	Thr	Cys	Leu	
			20					25					30			
ctc	atc	agc	tat	aca	acg	aat	aag	ttc	ccc	tcg	gaa	tat	gtg	ccg	aca	144
Leu	Ile	Ser	Tyr	Thr	Thr	Asn	Lys	Phe	Pro	Ser	Glu	Tyr	Val	Pro	Thr	
			35				40					45				
gtt	ttc	gac	aac	tat	gcc	gtc	acc	gtc	atg	atc	ggt	gat	gag	ccc	tat	192
Val	Phe	Asp	Asn	Tyr	Ala	Val	Thr	Val	Met	Ile	Gly	Asp	Glu	Pro	Tyr	
	50					55					60					
acg	ctc	ggc	ctg	ttc	gat	aca	gca	gga	caa	gaa	gat	tac	gac	cgt	tta	240
Thr	Leu	Gly	Leu	Phe	Asp	Thr	Ala	Gly	Gln	Glu	Asp	Tyr	Asp	Arg	Leu	
	65				70				75					80		
cgt	ccg	cta	tca	tac	ccc	cag	acc	gac	gtc	ttc	ctc	atc	tgc	ttc	agc	288
Arg	Pro	Leu	Ser	Pro	Gln	Thr	Asp	Val	Phe	Leu	Ile	Cys	Phe	Ser		
			85					90					95			
gtt	gca	tcg	ccc	gcc	tcg	ttc	gaa	aac	gtg	tcc	cag	aaa	tgg	gcc	ccc	336
Val	Ala	Ser	Pro	Ala	Ser	Phe	Glu	Asn	Val	Ser	Gln	Lys	Trp	Ala	Pro	
			100					105					110			
gaa	gtc	aac	cat	cac	tgc	ccc	ggc	gtg	ccc	ttc	ctc	atc	gtc	gga	acg	384
Glu	Val	Asn	His	His	Cys	Pro	Gly	Val	Pro	Phe	Leu	Ile	Val	Gly	Thr	
			115				120						125			
cag	aag	gat	ttg	cgc	tcc	gac	aag	gaa	ctg	agg	gac	aag	ctt	gcc	cag	432
Gln	Lys	Asp	Leu	Arg	Ser	Asp	Lys	Glu	Leu	Arg	Asp	Lys	Leu	Ala	Gln	
			130				135						140			
cgc	aag	cag	tcg	atg	ata	gag	ttc	aag	cag	gga	gag	aag	ctt	gct	cag	480
Arg	Lys	Gln	Ser	Met	Ile	Glu	Phe	Lys	Gln	Gly	Glu	Lys	Leu	Ala	Gln	
	145				150					155				160		
gat	ctt	gac	gcc	gtc	aaa	tac	gtc	gag	tgc	agt	gcg	ctg	aca	cag	gaa	528
Asp	Leu	Asp	Ala	Val	Lys	Tyr	Val	Glu	Cys	Ser	Ala	Leu	Thr	Gln	Glu	
				165				170					175			
ggt	ctc	aag	aac	gtg	ttt	gac	gag	gcc	atc	gtt	gcg	gca	ctg	gag	ccg	576
Gly	Leu	Lys	Asn	Val	Phe	Asp	Glu	Ala	Ile	Val	Ala	Ala	Leu	Glu	Pro	
			180					185					190			
cct	cag	aaa	aag	aca	agt	aaa	agg	gac	aag	aag	tgc	ttg	att	ctg		621
Pro	Gln	Lys	Lys	Thr	Ser	Lys	Arg	Asp	Lys	Lys	Cys	Leu	Ile	Leu		
			195				200						205			
tga																624

<210> 176

<211> 207
 <212> PRT
 <213> *Neurospora crassa*

<400> 176
 Met Val Thr Gly Thr Ile Lys Tyr Ala Lys Thr Asn His Pro Leu Ser
 1 5 10 15
 Arg Glu Cys Val Val Val Gly Asp Gly Ala Val Gly Lys Thr Cys Leu
 20 25 30
 Leu Ile Ser Tyr Thr Thr Asn Lys Phe Pro Ser Glu Tyr Val Pro Thr
 35 40 45
 Val Phe Asp Asn Tyr Ala Val Thr Val Met Ile Gly Asp Glu Pro Tyr
 50 55 60
 Thr Leu Gly Leu Phe Asp Thr Ala Gly Gln Glu Asp Tyr Asp Arg Leu
 65 70 75 80
 Arg Pro Leu Ser Tyr Pro Gln Thr Asp Val Phe Leu Ile Cys Phe Ser
 85 90 95
 Val Ala Ser Pro Ala Ser Phe Glu Asn Val Ser Gln Lys Trp Ala Pro
 100 105 110
 Glu Val Asn His His Cys Pro Gly Val Pro Phe Leu Ile Val Gly Thr
 115 120 125
 Gln Lys Asp Leu Arg Ser Asp Lys Glu Leu Arg Asp Lys Leu Ala Gln
 130 135 140
 Arg Lys Gln Ser Met Ile Glu Phe Lys Gln Gly Glu Lys Leu Ala Gln
 145 150 155 160
 Asp Leu Asp Ala Val Lys Tyr Val Glu Cys Ser Ala Leu Thr Gln Glu
 165 170 175
 Gly Leu Lys Asn Val Phe Asp Glu Ala Ile Val Ala Ala Leu Glu Pro
 180 185 190
 Pro Gln Lys Lys Thr Ser Lys Arg Asp Lys Lys Cys Leu Ile Leu
 195 200 205

<210> 177
 <211> 603
 <212> DNA
 <213> *Neurospora crassa*

<220>
 <221> CDS
 <222> (1)..(603)

<400> 177
 atg gca tca ggc agc cct cag aat gtc atc cgc agg aaa ctc gtc att 48
 Met Ala Ser Gly Ser Pro Gln Asn Val Ile Arg Arg Lys Leu Val Ile
 1 5 10 15
 atc ggc gac ggt gct tgc gga aaa acc agt cta ctg agc gtc ttc act 96
 Ile Gly Asp Gly Ala Cys Gly Lys Thr Ser Leu Leu Ser Val Phe Thr
 20 25 30
 ttg ggt ttt ttc cca gcc aca tat atc ccc acc gtg ttc gag aat tac 144
 Leu Gly Phe Phe Pro Ala Thr Tyr Ile Pro Thr Val Phe Glu Asn Tyr
 35 40 45
 gtt acc gac tgc cga gta gat ggc aag tgc gtt caa cta gcg cta tgg 192
 Val Thr Asp Cys Arg Val Asp Gly Lys Ser Val Gln Leu Ala Leu Trp
 50 55 60
 gac aca gcc gga caa gaa gac tat gag cga tta cga cca cta gca tac 240
 Asp Thr Ala Gly Gln Glu Asp Tyr Glu Arg Leu Arg Pro Leu Ala Tyr
 65 70 75 80
 tca aag gcg cat gtc att cta ata ggg ttt tct gtc gac acg cca gat 288
 Ser Lys Ala His Val Ile Leu Ile Gly Phe Ser Val Asp Thr Pro Asp
 85 90 95
 tct ttg gac aac gtt aaa cac aag tgg gtt act gag gcc aat gaa aga 336
 Ser Leu Asp Asn Val Lys His Lys Trp Val Thr Glu Ala Asn Glu Arg
 100 105 110
 tgt ccc aat gtt ccc atc att ttg gtg ggt ctc aag aag gat ctc agg 384
 Cys Pro Asn Val Pro Ile Ile Leu Val Gly Leu Lys Lys Asp Leu Arg
 115 120 125
 gga gat cct gtt gcc atc gaa gaa atg cga aag cga tcc caa cga ttc 432
 Gly Asp Pro Val Ala Ile Glu Glu Met Arg Lys Arg Ser Gln Arg Phe

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130	135	140	
gtg atg gag gac gaa ggc cag agg ata gca aag gag att ggc gct cga			480
Val Met Glu Asp Glu Gly Gln Arg Ile Ala Lys Glu Ile Gly Ala Arg			
145	150	155	160
aag tat ctc gaa tgt tcc agt ctt acc gga gaa ggt gtt gac gac gta			528
Lys Tyr Leu Glu Cys Ser Ser Leu Thr Gly Glu Gly Val Asp Asp Val			
165	170	175	
ttc gag gca gcc acg cga gcg gcg ctg cta acg ttt gag aag aag gaa			576
Phe Glu Ala Ala Thr Arg Ala Ala Leu Leu Thr Phe Glu Lys Lys Glu			
180	185	190	
gga agc ggg tgc tgt gtg att cta tga			603
Gly Ser Gly Cys Cys Val Ile Leu			
195	200		

<210> 178

<211> 200

<212> PRT

<213> Neurospora crassa

<400> 178

Met Ala Ser Gly Ser Pro Gln Asn Val Ile Arg Arg Lys Leu Val Ile	
1 5 10 15	
Ile Gly Asp Gly Ala Cys Gly Lys Thr Ser Leu Leu Ser Val Phe Thr	
20 25 30	
Leu Gly Phe Phe Pro Ala Thr Tyr Ile Pro Thr Val Phe Glu Asn Tyr	
35 40 45	
Val Thr Asp Cys Arg Val Asp Gly Lys Ser Val Gln Leu Ala Leu Trp	
50 55 60	
Asp Thr Ala Gly Gln Glu Asp Tyr Glu Arg Leu Arg Pro Leu Ala Tyr	
65 70 75 80	
Ser Lys Ala His Val Ile Leu Ile Gly Phe Ser Val Asp Thr Pro Asp	
85 90 95	
Ser Leu Asp Asn Val Lys His Lys Trp Val Thr Glu Ala Asn Glu Arg	
100 105 110	
Cys Pro Asn Val Pro Ile Ile Leu Val Gly Leu Lys Lys Asp Leu Arg	
115 120 125	
Gly Asp Pro Val Ala Ile Glu Met Arg Lys Arg Ser Gln Arg Phe	
130 135 140	
Val Met Glu Asp Glu Gly Gln Arg Ile Ala Lys Glu Ile Gly Ala Arg	
145 150 155 160	
Lys Tyr Leu Glu Cys Ser Ser Leu Thr Gly Glu Gly Val Asp Asp Val	
165 170 175	
Phe Glu Ala Ala Thr Arg Ala Ala Leu Thr Phe Glu Lys Lys Glu	
180 185 190	
Gly Ser Gly Cys Cys Val Ile Leu	
195 200	

<210> 179

<211> 624

<212> DNA

<213> Neurospora crassa

<220>

<221> CDS

<222> (1) .. (624)

<400> 179

atg cct tgc gga ctc gga ggg tgc aaa aca gtg cag cgc aag ctc gtc	48
Met Pro Cys Gly Leu Gly Gly Ser Lys Thr Val Gln Arg Lys Leu Val	
1 5 10 15	
ttg ctc ggc gat ggt gcc tgc gga aaa acc tca ctg ctc aac gtt ttc	96
Leu Leu Gly Asp Gly Ala Cys Gly Lys Thr Ser Leu Leu Asn Val Phe	
20 25 30	
aca aga ggc tat ttc ccc act gta tac gag ccg aca gtc ttc gag aac	144
Thr Arg Gly Tyr Phe Pro Thr Val Tyr Glu Pro Thr Val Phe Glu Asn	
35 40 45	
tat gtg cac gac att ttc gtc gac aat gtc cat att gaa ctg tca ttg	192

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Tyr	Val	His	Asp	Ile	Phe	Val	Asp	Asn	Val	His	Ile	Glu	Leu	Ser	Leu		
50						55				60							
tgg	gat	acc	gcc	ggc	cag	gaa	gaa	ttt	gac	agg	cta	cga	agt	cta	tca	240	
Trp	Asp	Thr	Ala	Gly	Gln	Glu	Glu	Phe	Asp	Arg	Leu	Arg	Ser	Leu	Ser		
65					70				75					80			
tac	gat	gac	acc	gac	tta	atc	atg	ctt	tgc	tac	tct	gtc	gac	agc	aag	288	
Tyr	Asp	Asp	Thr	Asp	Leu	Ile	Met	Leu	Cys	Tyr	Ser	Val	Asp	Ser	Lys		
				85					90					95			
gac	tcg	ctc	gaa	aac	gtc	gaa	agc	aaa	tgg	caa	ggc	gag	att	gct	gaa	336	
Asp	Ser	Leu	Glu	Asn	Val	Glu	Ser	Lys	Trp	Gln	Gly	Glu	Ile	Ala	Glu		
			100					105					110				
aac	tgc	ccg	ggc	gtc	aag	att	gtc	ttg	gtc	gcg	ttg	aag	tgc	gac	ctg	384	
Asn	Cys	Pro	Gly	Val	Lys	Ile	Val	Leu	Val	Ala	Leu	Lys	Cys	Asp	Leu		
		115					120					125					
cgc	gag	gcg	acc	gag	gac	gaa	gag	gat	ggc	gga	gcc	aac	gag	gac	ggg	432	
Arg	Glu	Ala	Thr	Glu	Asp	Glu	Glu	Asp	Gly	Gly	Ala	Asn	Glu	Asp	Gly		
	130					135				140							
gct	caa	cg	gag	aag	aag	cca	atg	atc	agc	tac	gac	cag	ggc	ctg	gaa	480	
Ala	Gln	Arg	Glu	Lys	Lys	Pro	Met	Ile	Ser	Tyr	Asp	Gln	Gly	Leu	Glu		
	145				150				155					160			
gtg	gct	cg	cg	atc	aag	gcc	ctt	cga	tat	ctc	gaa	tgc	tcc	gcc	atg	528	
Val	Ala	Arg	Arg	Ile	Lys	Ala	Leu	Arg	Tyr	Leu	Glu	Cys	Ser	Ala	Met		
				165					170					175			
cga	aac	cg	gga	gtc	aac	gaa	gcc	ttc	acc	gaa	gca	gcg	cgt	gtc	gct	576	
Arg	Asn	Arg	Gly	Val	Asn	Glu	Ala	Phe	Thr	Glu	Ala	Ala	Arg	Val	Ala		
			180				185					190					
ttg	tca	gtg	aag	aag	gac	cg	gag	gag	tcg	aag	tgc	gtg	gtc	atg		621	
Leu	Ser	Val	Lys	Lys	Asp	Arg	Glu	Glu	Ser	Lys	Cys	Val	Val	Met			
		195					200					205					
taa																624	

<210> 180

<211> 207

<212> PRT

<213> Neurospora crassa

<400> 180

Met	Pro	Cys	Gly	Leu	Gly	Gly	Ser	Lys	Thr	Val	Gln	Arg	Lys	Leu	Val		
1				5					10					15			
Leu	Leu	Gly	Asp	Gly	Ala	Cys	Gly	Lys	Thr	Ser	Leu	Leu	Asn	Val	Phe		
			20					25					30				
Thr	Arg	Gly	Tyr	Phe	Pro	Thr	Val	Tyr	Glu	Pro	Thr	Val	Phe	Glu	Asn		
		35				40						45					
Tyr	Val	His	Asp	Ile	Phe	Val	Asp	Asn	Val	His	Ile	Glu	Leu	Ser	Leu		
	50					55				60							
Trp	Asp	Thr	Ala	Gly	Gln	Glu	Glu	Phe	Asp	Arg	Leu	Arg	Ser	Leu	Ser		
65				70					75					80			
Tyr	Asp	Asp	Thr	Asp	Leu	Ile	Met	Leu	Cys	Tyr	Ser	Val	Asp	Ser	Lys		
				85					90					95			
Asp	Ser	Leu	Glu	Asn	Val	Glu	Ser	Lys	Trp	Gln	Gly	Glu	Ile	Ala	Glu		
			100					105					110				
Asn	Cys	Pro	Gly	Val	Lys	Ile	Val	Leu	Val	Ala	Leu	Lys	Cys	Asp	Leu		
		115					120					125					
Arg	Glu	Ala	Thr	Glu	Asp	Glu	Glu	Asp	Gly	Gly	Ala	Asn	Glu	Asp	Gly		
		130				135				140							
Ala	Gln	Arg	Glu	Lys	Lys	Pro	Met	Ile	Ser	Tyr	Asp	Gln	Gly	Leu	Glu		
		145			150				155					160			
Val	Ala	Arg	Arg	Ile	Lys	Ala	Leu	Arg	Tyr	Leu	Glu	Cys	Ser	Ala	Met		
			165						170					175			
Arg	Asn	Arg	Gly	Val	Asn	Glu	Ala	Phe	Thr	Glu	Ala	Ala	Arg	Val	Ala		
			180				185					190					
Leu	Ser	Val	Lys	Lys	Asp	Arg	Glu	Glu	Ser	Lys	Cys	Val	Val	Met			
		195					200					205					

<210> 181

<211> 645
 <212> DNA
 <213> Gallus gallus

<220>
 <221> CDS
 <222> (1)..(645)

<400> 181

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atg ccc ggg gga ggg cgg gct ccg gcc atg gcc cat ggc agc gcc gcg      48
Met Pro Gly Gly Gly Arg Ala Pro Ala Met Ala His Gly Ser Ala Ala
1          5          10          15
gtc atg ctg aag tgc gtg gtg gtg ggg gac ggc gcc gtg ggc aag acg      96
Val Met Leu Lys Cys Val Val Val Gly Asp Gly Ala Val Gly Lys Thr
          20          25          30
tgc ctg ctg atg agc tac gcc aac gac gcc ttc cct gag gag tac gtg      144
Cys Leu Leu Met Ser Tyr Ala Asn Asp Ala Phe Pro Glu Glu Tyr Val
          35          40          45
ccc acc gtc ttc gac cac tac gca gtc agc gtt acc gtg gag ggc aag      192
Pro Thr Val Phe Asp His Tyr Ala Val Ser Val Thr Val Glu Gly Lys
          50          55          60
cag tac ctg ctg ggg ctc tac gac acc gcc ggg cag gaa gac tat gac      240
Gln Tyr Leu Leu Gly Leu Tyr Asp Thr Ala Gly Gln Glu Asp Tyr Asp
          65          70          75          80
cgt ctg aga cct tta tct tat cct atg acc gat gtc ttc ctt atc tgc      288
Arg Leu Arg Pro Leu Ser Tyr Pro Met Thr Asp Val Phe Leu Ile Cys
          85          90          95
ttc tca gtg gta aac cct gct tca ttt caa aac gtg aag gaa gaa tgg      336
Phe Ser Val Val Asn Pro Ala Ser Phe Gln Asn Val Lys Glu Glu Trp
          100          105          110
gta ccg gag ttg aag gaa tat gca cct aat gtt cct ttt tta cta gta      384
Val Pro Glu Leu Lys Glu Tyr Ala Pro Asn Val Pro Phe Leu Leu Val
          115          120          125
gga aca cag att gat ctt cgt gat gac ccc aaa act ctg gca aga ttg      432
Gly Thr Gln Ile Asp Leu Arg Asp Asp Pro Lys Thr Leu Ala Arg Leu
          130          135          140
aat gat atg aaa gag aag cct tta tct gtg gaa caa gga cag aaa tta      480
Asn Asp Met Lys Glu Lys Pro Leu Ser Val Glu Gln Gly Gln Lys Leu
          145          150          155          160
gca aaa gag ata gga gcc tac tgc tat gtg gag tgt tca gct tta aca      528
Ala Lys Glu Ile Gly Ala Tyr Cys Tyr Val Glu Cys Ser Ala Leu Thr
          165          170          175
cag aaa gga ctg aag act gtt ttt gat gaa gct att ata gcc att cta      576
Gln Lys Gly Leu Lys Thr Val Phe Asp Glu Ala Ile Ile Ala Ile Leu
          180          185          190
act cca aag aaa cac acg gtg aag aag aga ata ggt tgc aga tgc ata      624
Thr Pro Lys Lys His Thr Val Lys Lys Arg Ile Gly Ser Arg Cys Ile
          195          200          205
aac tgc tgt ttg atc acg tga
Asn Cys Cys Leu Ile Thr
          210

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<210> 182
 <211> 214
 <212> PRT
 <213> Gallus gallus

<400> 182

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Met Pro Gly Gly Gly Arg Ala Pro Ala Met Ala His Gly Ser Ala Ala
1          5          10          15
Val Met Leu Lys Cys Val Val Val Gly Asp Gly Ala Val Gly Lys Thr
          20          25          30
Cys Leu Leu Met Ser Tyr Ala Asn Asp Ala Phe Pro Glu Glu Tyr Val
          35          40          45
Pro Thr Val Phe Asp His Tyr Ala Val Ser Val Thr Val Glu Gly Lys
          50          55          60
Gln Tyr Leu Leu Gly Leu Tyr Asp Thr Ala Gly Gln Glu Asp Tyr Asp

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65 70 75 80
 Arg Leu Arg Pro Leu Ser Tyr Pro Met Thr Asp Val Phe Leu Ile Cys
 85 90 95
 Phe Ser Val Val Asn Pro Ala Ser Phe Gln Asn Val Lys Glu Glu Trp
 100 105 110
 Val Pro Glu Leu Lys Glu Tyr Ala Pro Asn Val Pro Phe Leu Leu Val
 115 120 125
 Gly Thr Gln Ile Asp Leu Arg Asp Asp Pro Lys Thr Leu Ala Arg Leu
 130 135 140
 Asn Asp Met Lys Glu Lys Pro Leu Ser Val Glu Gln Gly Gln Lys Leu
 145 150 155 160
 Ala Lys Glu Ile Gly Ala Tyr Cys Tyr Val Glu Cys Ser Ala Leu Thr
 165 170 175
 Gln Lys Gly Leu Lys Thr Val Phe Asp Glu Ala Ile Ile Ala Ile Leu
 180 185 190
 Thr Pro Lys Lys His Thr Val Lys Arg Ile Gly Ser Arg Cys Ile
 195 200 205
 Asn Cys Cys Leu Ile Thr
 210

<210> 183

<211> 582

<212> DNA

<213> Brachydanio rerio

<220>

<221> CDS

<222> (1)...(582)

<400> 183

atg gct gca att cga aag aaa ctt gtc ata gtc ggt gat gga gcc tgt 48
 Met Ala Ala Ile Arg Lys Lys Leu Val Ile Val Gly Asp Gly Ala Cys
 1 5 10 15
 gga aag acc tgt ttg ctc ata gtt ttc agt aaa gat cag ttt ccc gaa 96
 Gly Lys Thr Cys Leu Leu Ile Val Phe Ser Lys Asp Gln Phe Pro Glu
 20 25 30
 gtc tac gtg ccg aca gtc ttc gag aac tac gtt gca gat atc gag gtc 144
 Val Tyr Val Pro Thr Val Phe Glu Asn Tyr Val Ala Asp Ile Glu Val
 35 40 45
 gat tca aaa cag gtt gag ctt gcc tta tgg gat act gct gga cag gag 192
 Asp Ser Lys Gln Val Glu Leu Ala Leu Trp Asp Thr Ala Gly Gln Glu
 50 55 60
 gac tat gat cgg tta aga ccc ctc tcc tat cct gac aca gat gtt att 240
 Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Asp Thr Asp Val Ile
 65 70 75 80
 ctc atg tgc ttc tcc atc gac agt cct gat agc ttg gaa aat atc cca 288
 Leu Met Cys Phe Ser Ile Asp Ser Pro Asp Ser Leu Glu Asn Ile Pro
 85 90 95
 gaa aaa tgg aca cca gag gtg aag cat ttc tgt ccc aat gtt ccc atc 336
 Glu Lys Trp Thr Pro Glu Val Lys His Phe Cys Pro Asn Val Pro Ile
 100 105 110
 atc ctc gtg ggt aac aaa aag gat ctc cgg aat gat gag cac aca cga 384
 Ile Leu Val Gly Asn Lys Lys Asp Leu Arg Asn Asp Glu His Thr Arg
 115 120 125
 agg gaa ctt gcc aaa atg aaa cag gag ccg gta aag cca gaa gaa ggg 432
 Arg Glu Leu Ala Lys Met Lys Gln Glu Pro Val Lys Pro Glu Glu Gly
 130 135 140
 cga gac atg gcc aac cga atc aat gcc ttt ggt tat cta gag tgt tcg 480
 Arg Asp Met Ala Asn Arg Ile Asn Ala Phe Gly Tyr Leu Glu Cys Ser
 145 150 155 160
 gcc aaa aca aaa gat ggc gtg aga gaa gtc ttt gaa atg gcc acc agg 528
 Ala Lys Thr Lys Asp Gly Val Arg Glu Val Phe Glu Met Ala Thr Arg
 165 170 175
 gcg gcg ctg caa gcc aga aaa cgt ggt aaa aag agc ggc tgc ctg ctg 576
 Ala Ala Leu Gln Ala Arg Lys Arg Gly Lys Lys Ser Gly Cys Leu Leu
 180 185 190
 tta taa 582
 Leu

<210> 184
 <211> 193
 <212> PRT
 <213> Brachydanio rerio

<400> 184
 Met Ala Ala Ile Arg Lys Lys Leu Val Ile Val Gly Asp Gly Ala Cys
 1 5 10 15
 Gly Lys Thr Cys Leu Leu Ile Val Phe Ser Lys Asp Gln Phe Pro Glu
 20 25 30
 Val Tyr Val Pro Thr Val Phe Glu Asn Tyr Val Ala Asp Ile Glu Val
 35 40 45
 Asp Ser Lys Gln Val Glu Leu Ala Leu Trp Asp Thr Ala Gly Gln Glu
 50 55 60
 Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Asp Thr Asp Val Ile
 65 70 75 80
 Leu Met Cys Phe Ser Ile Asp Ser Pro Asp Ser Leu Glu Asn Ile Pro
 85 90 95
 Glu Lys Trp Thr Pro Glu Val Lys His Phe Cys Pro Asn Val Pro Ile
 100 105 110
 Ile Leu Val Gly Asn Lys Lys Asp Leu Arg Asn Asp Glu His Thr Arg
 115 120 125
 Arg Glu Leu Ala Lys Met Lys Gln Glu Pro Val Lys Pro Glu Glu Gly
 130 135 140
 Arg Asp Met Ala Asn Arg Ile Asn Ala Phe Gly Tyr Leu Glu Cys Ser
 145 150 155 160
 Ala Lys Thr Lys Asp Gly Val Arg Glu Val Phe Glu Met Ala Thr Arg
 165 170 175
 Ala Ala Leu Gln Ala Arg Lys Arg Gly Lys Lys Ser Gly Cys Leu Leu
 180 185 190
 Leu

<210> 185
 <211> 582
 <212> DNA
 <213> Brachydanio rerio

<220>
 <221> CDS
 <222> (1)...(582)

<400> 185
 atg gcg gct atc agg aaa aag ctg gtg atc gtg gga gat gga gca tgt 48
 Met Ala Ala Ile Arg Lys Lys Leu Val Ile Val Gly Asp Gly Ala Cys
 1 5 10 15
 ggg aag acc tgt cta ctc ata gtg ttc agc aaa gac cag ttt cca gaa 96
 Gly Lys Thr Cys Leu Leu Ile Val Phe Ser Lys Asp Gln Phe Pro Glu
 20 25 30
 gtc tac gtg cct act gtg ttc gag aac tac att gct gac att gaa gtc 144
 Val Tyr Val Pro Thr Val Phe Glu Asn Tyr Ile Ala Asp Ile Glu Val
 35 40 45
 gac agc aaa cag gtg gag ctg gca ttg tgg gac aca gca gga cag gag 192
 Asp Ser Lys Gln Val Glu Leu Ala Leu Trp Asp Thr Ala Gly Gln Glu
 50 55 60
 gac tat gac cgt ctc aga cct ctg tct tac cca gac aca gat gtc atc 240
 Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Asp Thr Asp Val Ile
 65 70 75 80
 ctc atg tgc ttc tcc ata gac agt ccc gac agt tta gag aat atc cca 288
 Leu Met Cys Phe Ser Ile Asp Ser Pro Asp Ser Leu Glu Asn Ile Pro
 85 90 95
 gaa aag tgg acg ccg gag gta aag cac ttc tgc ccc aac gtt ccc ata 336
 Glu Lys Trp Thr Pro Glu Val Lys His Phe Cys Pro Asn Val Pro Ile
 100 105 110
 atc ctg gtg ggc aat aag aga gat ctg cgt act gat gag aac aca cgg 384

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Ile Leu Val Gly Asn Lys Arg Asp Leu Arg Thr Asp Glu Asn Thr Arg
      115      120      125
agg gag ctg act aag atg aag cag gag cca gtt aaa ata gaa gag ggc      432
Arg Glu Leu Thr Lys Met Lys Gln Glu Pro Val Lys Ile Glu Glu Gly
      130      135      140
agg gac atg gct aac cgc att agc gcc ttc ggc tac ctg gaa tgc tca      480
Arg Asp Met Ala Asn Arg Ile Ser Ala Phe Gly Tyr Leu Glu Cys Ser
      145      150      155      160
gct aag act aag gat ggc gtg agg gaa gtt ttt gaa atg gcc acc aga      528
Ala Lys Thr Lys Asp Gly Val Arg Glu Val Phe Glu Met Ala Thr Arg
      165      170      175
gcg gcg ctg cag gtt cgc aag agg aag aag agg agc ggg tgc tca ctg      576
Ala Ala Leu Gln Val Arg Lys Arg Lys Lys Arg Ser Gly Cys Ser Leu
      180      185      190
ttg tga
Leu

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<210> 186
 <211> 193
 <212> PRT
 <213> Brachydanio rerio

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<400> 186
Met Ala Ala Ile Arg Lys Lys Leu Val Ile Val Gly Asp Gly Ala Cys
1      5      10      15
Gly Lys Thr Cys Leu Leu Ile Val Phe Ser Lys Asp Gln Phe Pro Glu
      20      25      30
Val Tyr Val Pro Thr Val Phe Glu Asn Tyr Ile Ala Asp Ile Glu Val
      35      40      45
Asp Ser Lys Gln Val Glu Leu Ala Leu Trp Asp Thr Ala Gly Gln Glu
      50      55      60
Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Asp Thr Asp Val Ile
      65      70      75      80
Leu Met Cys Phe Ser Ile Asp Ser Pro Asp Ser Leu Glu Asn Ile Pro
      85      90      95
Glu Lys Trp Thr Pro Glu Val Lys His Phe Cys Pro Asn Val Pro Ile
      100      105      110
Ile Leu Val Gly Asn Lys Arg Asp Leu Arg Thr Asp Glu Asn Thr Arg
      115      120      125
Arg Glu Leu Thr Lys Met Lys Gln Glu Pro Val Lys Ile Glu Glu Gly
      130      135      140
Arg Asp Met Ala Asn Arg Ile Ser Ala Phe Gly Tyr Leu Glu Cys Ser
      145      150      155      160
Ala Lys Thr Lys Asp Gly Val Arg Glu Val Phe Glu Met Ala Thr Arg
      165      170      175
Ala Ala Leu Gln Val Arg Lys Arg Lys Lys Arg Ser Gly Cys Ser Leu
      180      185      190
Leu

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<210> 187
 <211> 806
 <212> DNA
 <213> Ciona intestinalis

<220>
 <221> CDS
 <222> (1)..(750)

```

<400> 187
atg gaa agg ata ccc aat gac gtc aaa ggt gct ttc ccc gag cag caa      48
Met Glu Arg Ile Pro Asn Asp Val Lys Gly Ala Phe Pro Glu Gln Gln
1      5      10      15
ccc aaa att aaa tgt gtt ata gtt ggg gat ggt gga tgc ggt aaa act      96
Pro Lys Ile Lys Cys Val Ile Val Gly Asp Gly Gly Cys Gly Lys Thr
      20      25      30

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tca atg ctg gtt gta tat act gaa ggc gaa ttc cct gaa gtg tac acg	144
Ser Met Leu Val Val Tyr Thr Glu Gly Glu Phe Pro Glu Val Tyr Thr	
35 40 45	
ccc acg gtg ttt gaa aat tac agc aga gag gtg gaa tta aat cga aag	192
Pro Thr Val Phe Glu Asn Tyr Ser Arg Glu Val Glu Leu Asn Arg Lys	
50 55 60	
aag gcg gtg cta aca ttg tgg gat acg gcg ggt cag gaa gat tat gac	240
Lys Ala Val Leu Thr Leu Trp Asp Thr Ala Gly Gln Glu Asp Tyr Asp	
65 70 75 80	
cgg ctt cga cct ctc tct tac aac aac gca gac atc ata atc atc tgc	288
Arg Leu Arg Pro Leu Ser Tyr Asn Asn Ala Asp Ile Ile Ile Cys	
85 90 95	
tat gac gtc aca aac ctt tca agc ttc cag aac gta gaa atc cga tgg	336
Tyr Asp Val Thr Asn Leu Ser Ser Phe Gln Asn Val Glu Ile Arg Trp	
100 105 110	
tcg cca gaa atc cgc cat ttt tgc ccc cac acg cct acg atg ctg gtt	384
Ser Pro Glu Ile Arg His Phe Cys Pro His Thr Pro Thr Met Leu Val	
115 120 125	
gcg tgt aaa act gac ctg agg tct cag gtg aac tcg gat tca att tca	432
Ala Cys Lys Thr Asp Leu Arg Ser Gln Val Asn Ser Asp Ser Ile Ser	
130 135 140	
aac tct atg act cga tct gct tcc atg gca acc aca tta aca aca act	480
Asn Ser Met Thr Arg Ser Ala Ser Met Ala Thr Thr Leu Thr Thr Thr	
145 150 155 160	
gga gta gat tta aca gaa atg acg tca tct acg tta agt gta aat tcg	528
Gly Val Asp Leu Thr Glu Met Thr Ser Ser Thr Leu Ser Val Asn Ser	
165 170 175	
gta cgc gca gaa gat gga aca gac aga cac gat gat caa gca ata gtt	576
Val Arg Ala Glu Asp Gly Thr Asp Arg His Asp Asp Gln Ala Ile Val	
180 185 190	
aca aca gaa atg ggc gag aag atg tcg aaa cac atc aac gtc aat cat	624
Thr Thr Glu Met Gly Glu Lys Met Ser Lys His Ile Asn Val Asn His	
195 200 205	
ttt gtt gaa tgt tct gcc aag gat ggc aca aac att gaa caa gta ttt	672
Phe Val Glu Cys Ser Ala Lys Asp Gly Thr Asn Ile Glu Gln Val Phe	
210 215 220	
aaa ctt gca atc gaa tgc gtc att aaa cgt gaa gca aaa gtc ggt cca	720
Lys Leu Ala Ile Glu Cys Val Ile Lys Arg Glu Ala Lys Val Gly Pro	
225 230 235 240	
aaa aac tgc tgc tgt tgt ttg cta ttg tgatcgcgtg ttacgtaa	767
Lys Asn Cys Cys Cys Cys Leu Leu Leu	
245	
aaattgactg tgtaggaaat gcctaacaaa tcaatcgcg	806

<210> 188

<211> 249

<212> PRT

<213> Ciona intestinalis

<400> 188

Met Glu Arg Ile Pro Asn Asp Val Lys Gly Ala Phe Pro Glu Gln Gln	
1 5 10 15	
Pro Lys Ile Lys Cys Val Ile Val Gly Asp Gly Gly Cys Gly Lys Thr	
20 25 30	
Ser Met Leu Val Val Tyr Thr Glu Gly Glu Phe Pro Glu Val Tyr Thr	
35 40 45	
Pro Thr Val Phe Glu Asn Tyr Ser Arg Glu Val Glu Leu Asn Arg Lys	
50 55 60	
Lys Ala Val Leu Thr Leu Trp Asp Thr Ala Gly Gln Glu Asp Tyr Asp	
65 70 75 80	
Arg Leu Arg Pro Leu Ser Tyr Asn Asn Ala Asp Ile Ile Ile Cys	
85 90 95	
Tyr Asp Val Thr Asn Leu Ser Ser Phe Gln Asn Val Glu Ile Arg Trp	
100 105 110	
Ser Pro Glu Ile Arg His Phe Cys Pro His Thr Pro Thr Met Leu Val	

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115	120	125
Ala Cys Lys Thr Asp Leu Arg Ser Gln Val Asn Ser Asp Ser Ile Ser		
130	135	140
Asn Ser Met Thr Arg Ser Ala Ser Met Ala Thr Thr Leu Thr Thr Thr		
145	150	155
Gly Val Asp Leu Thr Glu Met Thr Ser Ser Thr Leu Ser Val Asn Ser		
165	170	175
Val Arg Ala Glu Asp Gly Thr Asp Arg His Asp Asp Gln Ala Ile Val		
180	185	190
Thr Thr Glu Met Gly Glu Lys Met Ser Lys His Ile Asn Val Asn His		
195	200	205
Phe Val Glu Cys Ser Ala Lys Asp Gly Thr Asn Ile Glu Gln Val Phe		
210	215	220
Lys Leu Ala Ile Glu Cys Val Ile Lys Arg Glu Ala Lys Val Gly Pro		
225	230	235
Lys Asn Cys Cys Cys Cys Leu Leu Leu		
245		

<210> 189
 <211> 726
 <212> DNA
 <213> Ciona intestinalis

<220>
 <221> CDS
 <222> (14)..(598)

<400> 189
 ttgagttcat gaa atg cag tct ata aaa ttg gtc gtg gtg ggc gat ggt 49
 Met Gln Ser Ile Lys Leu Val Val Val Gly Asp Gly
 1 5 10
 gcc gtg gga aaa acg tgt cta ctt atc agc tac acg gcg aat gcc ttt 97
 Ala Val Gly Lys Thr Cys Leu Leu Ile Ser Tyr Thr Ala Asn Ala Phe
 15 20 25
 cca agg gag tat gtt ccg acc gtg ttt gaa aac tac atg gca aat atc 145
 Pro Arg Glu Tyr Val Pro Thr Val Phe Glu Asn Tyr Met Ala Asn Ile
 30 35 40
 acg gtc aac aat cag caa att tgc tta agt ctt tgg gat acc gct ggt 193
 Thr Val Asn Asn Gln Gln Ile Cys Leu Ser Leu Trp Asp Thr Ala Gly
 45 50 55 60
 caa gag gat ttt gac agg ttg aga ccg ctt tca tat cca gac acc gat 241
 Gln Glu Asp Phe Asp Arg Leu Arg Pro Leu Ser Tyr Pro Asp Thr Asp
 65 70 75
 gtc ttt gtt ctc tgc ttc tcg ata att tct cca acc tcc ttt gaa aat 289
 Val Phe Val Leu Cys Phe Ser Ile Ile Ser Pro Thr Ser Phe Glu Asn
 80 85 90
 ctc cag cac aaa tgg ttg ccc gag tta cga gaa cat tgt cct aat gtg 337
 Leu Gln His Lys Trp Leu Pro Glu Leu Arg Glu His Cys Pro Asn Val
 95 100 105
 ccc atc ctg cta gtg ggt acg aag ctt gac ttg aga gaa gac acc gaa 385
 Pro Ile Leu Leu Val Gly Thr Lys Leu Asp Leu Arg Glu Asp Thr Glu
 110 115 120
 att cta caa cag ctt tcc tcg aaa aat cta aaa cca ata aca cca gaa 433
 Ile Leu Gln Gln Leu Ser Ser Lys Asn Leu Lys Pro Ile Thr Pro Glu
 125 130 135 140
 gaa ggg gcg aaa atg gcg aaa gat att aaa gca gtt aaa tat tta gag 481
 Glu Gly Ala Lys Met Ala Lys Asp Ile Lys Ala Val Lys Tyr Leu Glu
 145 150 155
 tgt tct gct cta act cag gag tgt ctc agc caa gta ttt gat gac gct 529
 Cys Ser Ala Leu Thr Gln Glu Cys Leu Ser Gln Val Phe Asp Asp Ala
 160 165 170
 gtt att gca gtg cta aac cca tca cac ttt tca agt aac aat gac aac 577
 Val Ile Ala Val Leu Asn Pro Ser His Phe Ser Ser Asn Asn Asp Asn
 175 180 185
 agc tgt tgt aag atc gtt taaatttaca tctcgttggt tacttacagt 625
 Ser Cys Cys Lys Ile Val
 190
 gttatgtgta ttaacattac cgtgatacac acacgagttc atagggttaa aaacgagagt 685

tatattttct ttaaaattag ataaacactc attcccgta a

726

<210> 190
 <211> 194
 <212> PRT
 <213> Ciona intestinalis

<400> 190
 Met Gln Ser Ile Lys Leu Val Val Val Gly Asp Gly Ala Val Gly Lys
 1 5 10 15
 Thr Cys Leu Leu Ile Ser Tyr Thr Ala Asn Ala Phe Pro Arg Glu Tyr
 20 25 30
 Val Pro Thr Val Phe Glu Asn Tyr Met Ala Asn Ile Thr Val Asn Asn
 35 40 45
 Gln Gln Ile Cys Leu Ser Leu Trp Asp Thr Ala Gly Gln Glu Asp Phe
 50 55 60
 Asp Arg Leu Arg Pro Leu Ser Tyr Pro Asp Thr Asp Val Phe Val Leu
 65 70 75 80
 Cys Phe Ser Ile Ile Ser Pro Thr Ser Phe Glu Asn Leu Gln His Lys
 85 90 95
 Trp Leu Pro Glu Leu Arg Glu His Cys Pro Asn Val Pro Ile Leu Leu
 100 105 110
 Val Gly Thr Lys Leu Asp Leu Arg Glu Asp Thr Glu Ile Leu Gln Gln
 115 120 125
 Leu Ser Ser Lys Asn Leu Lys Pro Ile Thr Pro Glu Glu Gly Ala Lys
 130 135 140
 Met Ala Lys Asp Ile Lys Ala Val Lys Tyr Leu Glu Cys Ser Ala Leu
 145 150 155 160
 Thr Gln Glu Cys Leu Ser Gln Val Phe Asp Asp Ala Val Ile Ala Val
 165 170 175
 Leu Asn Pro Ser His Phe Ser Ser Asn Asn Asp Asn Ser Cys Cys Lys
 180 185 190
 Ile Val

<210> 191
 <211> 827
 <212> DNA
 <213> Ciona intestinalis

<220>
 <221> CDS
 <222> (34)..(615)

<400> 191
 atttgtaagg acgagaacca acacaacaaa ata atg cag tcc gtg aaa tgt gtt 54
 Met Gln Ser Val Lys Cys Val
 1 5
 gtg gtt gga gat gga gct gtt ggt aaa acc tgt ttg ctg atc agc tac 102
 Val Val Gly Asp Gly Ala Val Gly Lys Thr Cys Leu Leu Ile Ser Tyr
 10 15 20
 aca acc aat gct ttc cct gga gaa tat att ccc act gtg ttt gaa agc 150
 Thr Thr Asn Ala Phe Pro Gly Glu Tyr Ile Pro Thr Val Phe Glu Ser
 25 30 35
 tat gct gca aat gtt gtg gtg gat ggg aac cca gtg aac atc ggt tta 198
 Tyr Ala Ala Asn Val Val Val Asp Gly Asn Pro Val Asn Ile Gly Leu
 40 45 50 55
 tgg gac aca gct ggc cag gaa gat tac gat aaa ctt cga ccg cta tca 246
 Trp Asp Thr Ala Gly Gln Glu Asp Tyr Asp Lys Leu Arg Pro Leu Ser
 60 65 70
 tac cca cag tca gat gtc ttt gtc atg tgc ttc tcg ttg gta aac cca 294
 Tyr Pro Gln Ser Asp Val Phe Val Met Cys Phe Ser Leu Val Asn Pro
 75 80 85

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aca tct tat gaa aac att gca gaa aaa tgg tat ccg gaa gtt cat gaa      342
Thr Ser Tyr Glu Asn Ile Ala Glu Lys Trp Tyr Pro Glu Val His Glu
          90                      95                      100
cac tgt ccc gac atc ccc att gta ctc gtt ggg aca aaa ctg gat tta      390
His Cys Pro Asp Ile Pro Ile Val Leu Val Gly Thr Lys Leu Asp Leu
          105                      110                      115
cgt gaa gac cca gaa aca ctc aaa acg ttg ggt gag aga aat ctt gtt      438
Arg Glu Asp Pro Glu Thr Leu Lys Thr Leu Gly Glu Arg Asn Leu Val
          120                      125                      130                      135
cca gtt acc aaa acc cag ggc ctc cag ttg gcg aaa aaa gtt ggg gca      486
Pro Val Thr Lys Thr Gln Gly Leu Gln Leu Ala Lys Lys Val Gly Ala
          140                      145                      150
aag aaa tat ttt gag tgc tgc gcg ctt act cgt gaa aac tta gac gaa      534
Lys Lys Tyr Phe Glu Cys Ser Ala Leu Thr Arg Glu Asn Leu Asp Glu
          155                      160                      165
ctc ttt ctt gaa gca atg cgc aat gcc ctg aaa gga ccg gac aaa att      582
Leu Phe Leu Glu Ala Met Arg Asn Ala Leu Lys Gly Pro Asp Lys Ile
          170                      175                      180
gta aaa gag aaa cca aat tgt caa att atc taatcagcat ttaagaattt      632
Val Lys Glu Lys Pro Asn Cys Gln Ile Ile
          185                      190
tgagttaacg ctogaataat tgttcagtat acaactgtat accaaagtcc ataaaaataa      692

aaattaaaac tatagacttt gctgtacaca ttatacatgt cgttaccgca tgtggtgtag      752

cttaaacgat tgtgcaatac ctttatatta aaggttaatg ttttacagtc gtgagtaact      812

ggaactctct gcgta      827

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<210> 192

<211> 193

<212> PRT

<213> Ciona intestinalis

<400> 192

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Met Gln Ser Val Lys Cys Val Val Val Gly Asp Gly Ala Val Gly Lys
1          5          10          15
Thr Cys Leu Leu Ile Ser Tyr Thr Thr Asn Ala Phe Pro Gly Glu Tyr
          20          25          30
Ile Pro Thr Val Phe Glu Ser Tyr Ala Ala Asn Val Val Asp Gly
          35          40          45
Asn Pro Val Asn Ile Gly Leu Trp Asp Thr Ala Gly Gln Glu Asp Tyr
          50          55          60
Asp Lys Leu Arg Pro Leu Ser Tyr Pro Gln Ser Asp Val Phe Val Met
65          70          75          80
Cys Phe Ser Leu Val Asn Pro Thr Ser Tyr Glu Asn Ile Ala Glu Lys
          85          90          95
Trp Tyr Pro Glu Val His Glu His Cys Pro Asp Ile Pro Ile Val Leu
          100          105          110
Val Gly Thr Lys Leu Asp Leu Arg Glu Asp Pro Glu Thr Leu Lys Thr
          115          120          125
Leu Gly Glu Arg Asn Leu Val Pro Val Thr Lys Thr Gln Gly Leu Gln
          130          135          140
Leu Ala Lys Lys Val Gly Ala Lys Lys Tyr Phe Glu Cys Ser Ala Leu
145          150          155          160
Thr Arg Glu Asn Leu Asp Glu Leu Phe Leu Glu Ala Met Arg Asn Ala
          165          170          175
Leu Lys Gly Pro Asp Lys Ile Val Lys Glu Lys Pro Asn Cys Gln Ile
          180          185          190
Ile

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<210> 193
 <211> 718
 <212> DNA
 <213> *Ciona intestinalis*

<220>
 <221> CDS
 <222> (6)..(584)

<400> 193
 aagat atg caa gcg ata aag tgc gtt gtg gtt gga gat gga gct gtt ggt 50
 Met Gln Ala Ile Lys Cys Val Val Val Gly Asp Gly Ala Val Gly
 1 5 10 15
 aaa acc tgt ttg ctg atc agc tac aca act aac gct ttc cct gga gaa 98
 Lys Thr Cys Leu Leu Ile Ser Tyr Thr Thr Asn Ala Phe Pro Gly Glu
 20 25 30
 tat att ccc act gtg ttt gat aac tac tct gcc aat gtc atg gta gat 146
 Tyr Ile Pro Thr Val Phe Asp Asn Tyr Ser Ala Asn Val Met Val Asp
 35 40 45
 ggc cgc cct gtc aac ttg gga tta tgg gat aca gca gga cag gag gat 194
 Gly Arg Pro Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln Glu Asp
 50 55 60
 tat gac aga ctc cga cct ctc tcc tac cca caa acc gat gtt ttt ctc 242
 Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Gln Thr Asp Val Phe Leu
 65 70 75
 att tgt ttc tct gtg gct tct ccc gct tcc tac gaa aac gtg cgc gca 290
 Ile Cys Phe Ser Val Ala Ser Pro Ala Ser Tyr Glu Asn Val Arg Ala
 80 85 90 95
 aag tgg cac ccg gag gtc gca cac cac tgc ccg gaa acg ccc gta ctt 338
 Lys Trp His Pro Glu Val Ala His His Cys Pro Glu Thr Pro Val Leu
 100 105 110
 ctc gtg gga aca aaa ctt gat tta cgt gac gat gcg gac act gtg aac 386
 Leu Val Gly Thr Lys Leu Asp Leu Arg Asp Asp Ala Asp Thr Val Asn
 115 120 125
 aag cta gct gag aaa aag ctc tcc acc att act act acc caa ggt tta 434
 Lys Leu Ala Glu Lys Lys Leu Ser Thr Ile Thr Thr Thr Gln Gly Leu
 130 135 140
 caa atg gcg aag gaa ctg ggg gcg gtt aaa tac caa gag tgc tct gct 482
 Gln Met Ala Lys Glu Leu Gly Ala Val Lys Tyr Gln Glu Cys Ser Ala
 145 150 155
 ctg acg caa aag ggg ctg aaa aat gtt ttc gac gaa gcg att cgg gcg 530
 Leu Thr Gln Lys Gly Leu Lys Asn Val Phe Asp Glu Ala Ile Arg Ala
 160 165 170 175
 gtt ctt aac cca aca aga gtc gtc cga acg aag aac tgc gaa att 578
 Val Leu Asn Pro Thr Arg Arg Val Val Arg Thr Lys Asn Cys Glu Ile
 180 185 190
 cta tgattacatt gacatgtaga gcggcctcga acgtttacaa taatttgga 631
 Leu
 ttatgttccct atttaataaaa tggagttcgg tggctttata tattctctct tatcgtttta 691
 agcatttttaa aatcgtcgcct accgtgt 718

<210> 194
 <211> 192
 <212> PRT
 <213> *Ciona intestinalis*

<400> 194
 Met Gln Ala Ile Lys Cys Val Val Val Gly Asp Gly Ala Val Gly Lys
 1 5 10 15
 Thr Cys Leu Leu Ile Ser Tyr Thr Thr Asn Ala Phe Pro Gly Glu Tyr
 20 25 30
 Ile Pro Thr Val Phe Asp Asn Tyr Ser Ala Asn Val Met Val Asp Gly

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35	40	45
Arg Pro Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln Glu Asp Tyr		
50	55	60
Asp Arg Leu Arg Pro Leu Ser Tyr Pro Gln Thr Asp Val Phe Leu Ile		
65	70	75
Cys Phe Ser Val Ala Ser Pro Ala Ser Tyr Glu Asn Val Arg Ala Lys		
85	90	95
Trp His Pro Glu Val Ala His His Cys Pro Glu Thr Pro Val Leu Leu		
100	105	110
Val Gly Thr Lys Leu Asp Leu Arg Asp Asp Ala Asp Thr Val Asn Lys		
115	120	125
Leu Ala Glu Lys Lys Leu Ser Thr Ile Thr Thr Thr Gln Gly Leu Gln		
130	135	140
Met Ala Lys Glu Leu Gly Ala Val Lys Tyr Gln Glu Cys Ser Ala Leu		
145	150	155
Thr Gln Lys Gly Leu Lys Asn Val Phe Asp Glu Ala Ile Arg Ala Val		
165	170	175
Leu Asn Pro Thr Arg Arg Val Val Arg Thr Lys Asn Cys Glu Ile Leu		
180	185	190

<210> 195

<211> 579

<212> DNA

<213> Ciona intestinalis

<220>

<221> CDS

<222> (1)..(579)

<400> 195

atg cag gcg atc aag tgt gtt gtg gtt gga gat gga gct gtt ggt aaa	48
Met Gln Ala Ile Lys Cys Val Val Val Gly Asp Gly Ala Val Gly Lys	
1	5
acc tgt ttg ctg atc agc tac aca acc aat gct ttc cct gga gaa tat	96
Thr Cys Leu Leu Ile Ser Tyr Thr Thr Asn Ala Phe Pro Gly Glu Tyr	
20	25
att ccc act gtg ttt gat aac tac tct gcc aat gtc atg gta gat ggc	144
Ile Pro Thr Val Phe Asp Asn Tyr Ser Ala Asn Val Met Val Asp Gly	
35	40
cgc cct gtc aac ttg gga tta tgg gat aca gca ggg cag gag gat tac	192
Arg Pro Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln Glu Asp Tyr	
50	55
gac aga ctt cgg cct ctc tcc tac cca caa acg gac gtt ttt ctg atc	240
Asp Arg Leu Arg Pro Leu Ser Tyr Pro Gln Thr Asp Val Phe Leu Ile	
65	70
tgt ttc tca ctc gtg tca cca gcc tca ttc gaa aac gtg cgc gca aag	288
Cys Phe Ser Leu Val Ser Pro Ala Ser Phe Glu Asn Val Arg Ala Lys	
85	90
tgg tat cca gaa gtc gca cac cac tgt cca gat aca ccg gtc att ctc	336
Trp Tyr Pro Glu Val Ala His His Cys Pro Asp Thr Pro Val Ile Leu	
100	105
gtg gga aca aaa ctt gat tta cgt gac gac cag gaa acc atc caa aag	384
Val Gly Thr Lys Leu Asp Leu Arg Asp Asp Gln Glu Thr Ile Gln Lys	
115	120
ctg aaa gaa aag aaa ctt gcc cca atc ctc tac cca caa ggg ttg cag	432
Leu Lys Glu Lys Lys Leu Ala Pro Ile Leu Tyr Pro Gln Gly Leu Gln	
130	135
atg gcg aaa gaa gtg aac gcc gta aag tac ctg gag tgc tgc gct ctc	480
Met Ala Lys Glu Val Asn Ala Val Lys Tyr Leu Glu Cys Ser Ala Leu	
145	150
acc caa aaa ggc ctg aaa acc gtt ttc gac gag gcg atc cgc gcc gtc	528
Thr Gln Lys Gly Leu Lys Thr Val Phe Asp Glu Ala Ile Arg Ala Val	
165	170
ctg tgc cct gag caa aag ccg aag aaa aag aag ccc tgc gag ctt ttg	576
Leu Cys Pro Glu Gln Lys Pro Lys Lys Lys Lys Pro Cys Glu Leu Leu	
180	185
tga	579

<210> 196
 <211> 192
 <212> PRT
 <213> Ciona intestinalis

<400> 196
 Met Gln Ala Ile Lys Cys Val Val Val Gly Asp Gly Ala Val Gly Lys
 1 5 10 15
 Thr Cys Leu Leu Ile Ser Tyr Thr Thr Asn Ala Phe Pro Gly Glu Tyr
 20 25 30
 Ile Pro Thr Val Phe Asp Asn Tyr Ser Ala Asn Val Met Val Asp Gly
 35 40 45
 Arg Pro Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln Glu Asp Tyr
 50 55 60
 Asp Arg Leu Arg Pro Leu Ser Tyr Pro Gln Thr Asp Val Phe Leu Ile
 65 70 75 80
 Cys Phe Ser Leu Val Ser Pro Ala Ser Phe Glu Asn Val Arg Ala Lys
 85 90 95
 Trp Tyr Pro Glu Val Ala His His Cys Pro Asp Thr Pro Val Ile Leu
 100 105 110
 Val Gly Thr Lys Leu Asp Leu Arg Asp Asp Gln Glu Thr Ile Gln Lys
 115 120 125
 Leu Lys Glu Lys Lys Leu Ala Pro Ile Leu Tyr Pro Gln Gly Leu Gln
 130 135 140
 Met Ala Lys Glu Val Asn Ala Val Lys Tyr Leu Glu Cys Ser Ala Leu
 145 150 155 160
 Thr Gln Lys Gly Leu Lys Thr Val Phe Asp Glu Ala Ile Arg Ala Val
 165 170 175
 Leu Cys Pro Glu Gln Lys Pro Lys Lys Lys Pro Cys Glu Leu Leu
 180 185 190

<210> 197
 <211> 727
 <212> DNA
 <213> Ciona intestinalis

<220>
 <221> CDS
 <222> (1)..(582)

<400> 197
 atg gct tca att cgt aag aag ctg gta ata gtt ggt gat ggt gct tgt 48
 Met Ala Ser Ile Arg Lys Lys Leu Val Ile Val Gly Asp Gly Ala Cys
 1 5 10 15
 ggt aaa act tgc tta ctc atc gtg ttt agc aaa gat caa ttc cca gaa 96
 Gly Lys Thr Cys Leu Leu Ile Val Phe Ser Lys Asp Gln Phe Pro Glu
 20 25 30
 gtt tac gtc cca act gtt ttt gaa aac tat gtg gct gat att gaa gta 144
 Val Tyr Val Pro Thr Val Phe Glu Asn Tyr Val Ala Asp Ile Glu Val
 35 40 45
 gac tct aaa cag gtt gag ctt gct ttg tgg gat aca gct ggt caa gaa 192
 Asp Ser Lys Gln Val Glu Leu Ala Leu Trp Asp Thr Ala Gly Gln Glu
 50 55 60
 gat tac gac agg ctt cgt cca ctt tcc tac ccc gat act gat gtt att 240
 Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Asp Thr Asp Val Ile
 65 70 75 80
 ctt atg tgt ttc tca atc gac agc cca gat tca ctt gag aac att ccc 288
 Leu Met Cys Phe Ser Ile Asp Ser Pro Asp Ser Leu Glu Asn Ile Pro
 85 90 95
 gaa aaa tgg acc cct gag gta agg cat ttt tgc cca agt gtt cca atc 336
 Glu Lys Trp Thr Pro Glu Val Arg His Phe Cys Pro Ser Val Pro Ile
 100 105 110
 att ttg gtt gga aac aaa aaa gat ctt cgt aac gac agt tca aca ata 384
 Ile Leu Val Gly Asn Lys Lys Asp Leu Arg Asn Asp Ser Ser Thr Ile
 115 120 125

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aag gaa ctt gct aaa atg aaa caa tct gcc gtt agt aac gaa gat gga      432
Lys Glu Leu Ala Lys Met Lys Gln Ser Ala Val Ser Asn Glu Asp Gly
130      135      140
atg gcg atg gca gag aag att ggc gct tac gga tat atg gaa tgt tca      480
Met Ala Met Ala Glu Lys Ile Gly Ala Tyr Gly Tyr Met Glu Cys Ser
145      150      155      160
gcg cgc acc aaa gaa ggt gtt cgg gaa gtg ttt gag ctt gca act aaa      528
Ala Arg Thr Lys Glu Gly Val Arg Glu Val Phe Glu Leu Ala Thr Lys
165      170      175
gca gct tta caa acc aag aaa aga aag aaa aag agt gga tgt gaa gtc      576
Ala Ala Leu Gln Thr Lys Lys Arg Lys Lys Lys Ser Gly Cys Glu Val
180      185      190
ttg taaagaaatt ttaactggag tctagcaatt gacttaacat tggacgcatg      629
Leu

ctttcatact ccccaacaaa ttaatatatta caatgttggg aacgtattct gcatgacttg      689
.....

aactcaatta ctcaaataga tggcaggatt tatacaca      727

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<210> 198
 <211> 193
 <212> PRT
 <213> *Ciona intestinalis*

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<400> 198
Met Ala Ser Ile Arg Lys Lys Leu Val Ile Val Gly Asp Gly Ala Cys
1      5      10      15
Gly Lys Thr Cys Leu Leu Ile Val Phe Ser Lys Asp Gln Phe Pro Glu
20      25      30
Val Tyr Val Pro Thr Val Phe Glu Asn Tyr Val Ala Asp Ile Glu Val
35      40      45
Asp Ser Lys Gln Val Glu Leu Ala Leu Trp Asp Thr Ala Gly Gln Glu
50      55      60
Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Asp Thr Asp Val Ile
65      70      75      80
Leu Met Cys Phe Ser Ile Asp Ser Pro Asp Ser Leu Glu Asn Ile Pro
85      90      95
Glu Lys Trp Thr Pro Glu Val Arg His Phe Cys Pro Ser Val Pro Ile
100      105      110
Ile Leu Val Gly Asn Lys Lys Asp Leu Arg Asn Asp Ser Ser Thr Ile
115      120      125
Lys Glu Leu Ala Lys Met Lys Gln Ser Ala Val Ser Asn Glu Asp Gly
130      135      140
Met Ala Met Ala Glu Lys Ile Gly Ala Tyr Gly Tyr Met Glu Cys Ser
145      150      155      160
Ala Arg Thr Lys Glu Gly Val Arg Glu Val Phe Glu Leu Ala Thr Lys
165      170      175
Ala Ala Leu Gln Thr Lys Lys Arg Lys Lys Lys Ser Gly Cys Glu Val
180      185      190
Leu

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<210> 199
 <211> 714
 <212> DNA
 <213> *Trichomonas vaginalis*

<220>
 <221> CDS
 <222> (11)..(613)

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<400> 199
atttcgctag atg aag cat atc aaa tgc gtt gtt gtc ggt gat ggt gca      49
Met Lys His Ile Lys Cys Val Val Val Gly Asp Gly Ala

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      1           5           10
gtc ggt aag act tgc ctt ctt atc tca ttc act aca aat gct ttc cca      97
Val Gly Lys Thr Cys Leu Leu Ile Ser Phe Thr Thr Asn Ala Phe Pro
      15           20           25
ggt gaa tat atc cca aca gtt ttc gat aac tac tct gca aac gtt atg      145
Gly Glu Tyr Ile Pro Thr Val Phe Asp Asn Tyr Ser Ala Asn Val Met
      30           35           40           45
gct gaa gga cat cct cca gtc aac ctc cag ctt tgg gat aca gct ggc      193
Ala Glu Gly His Pro Pro Val Asn Leu Gln Leu Trp Asp Thr Ala Gly
      50           55           60
cag gaa gac tac aag aag ctt cgc cca ctt tct tac cct caa aca gat      241
Gln Glu Asp Tyr Lys Lys Leu Arg Pro Leu Ser Tyr Pro Gln Thr Asp
      65           70           75
gtt ttc ctc ctc tgt ttc tct tta gtt tat cca gct tct ctc gag aac      289
Val Phe Leu Leu Cys Phe Ser Leu Val Tyr Pro Ala Ser Leu Glu Asn
      80           85           90
atc gag acc atg tgg atc aaa gaa atc aag gaa tac tgc cca gac aag      337
Ile Glu Thr Met Trp Ile Lys Glu Ile Lys Glu Tyr Cys Pro Asp Lys
      95           100           105
cca tac atc ctt gtc ggt ctt aag tcc gat ctt cgt gat gaa ttc gat      385
Pro Tyr Ile Leu Val Gly Leu Lys Ser Asp Leu Arg Asp Glu Phe Asp
      110           115           120           125
cag cgc gca gat gaa ctc cgc gct aag ggt tac gag cca atc cca cgc      433
Gln Arg Ala Asp Glu Leu Arg Ala Lys Gly Tyr Glu Pro Ile Pro Arg
      130           135           140
gct aag ggt gag gaa atg gca aag aag atc aac gcc tgc tcc tac ata      481
Ala Lys Gly Glu Glu Met Ala Lys Lys Ile Asn Ala Cys Ser Tyr Ile
      145           150           155
gaa tgc tct gcc ctt aaa tca tac aac ctc act gaa gtt ttc gat gaa      529
Glu Cys Ser Ala Leu Lys Ser Tyr Asn Leu Thr Glu Val Phe Asp Glu
      160           165           170
gcc gtc aag tac gct ctc gaa cca cca gct cag cag acc cag act aaa      577
Ala Val Lys Tyr Ala Leu Glu Pro Pro Ala Gln Gln Thr Gln Thr Lys
      175           180           185
gaa aag aca ggt ggt ggc tgc tgc gaa ctt att taaatttttt gcatatatgg      630
Glu Lys Thr Gly Gly Gly Cys Cys Glu Leu Ile
      190           195           200
taccagagtt aaaataaaac atgttgaatg ctgtgacaaa caactttata atccgactcg      690

gtgtaataat aaaagggaat tagg      714

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<210> 200

<211> 200

<212> PRT

<213> *Trichomonas vaginalis*

<400> 200

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Met Lys His Ile Lys Cys Val Val Val Gly Asp Gly Ala Val Gly Lys
1           5           10           15
Thr Cys Leu Leu Ile Ser Phe Thr Thr Asn Ala Phe Pro Gly Glu Tyr
      20           25           30
Ile Pro Thr Val Phe Asp Asn Tyr Ser Ala Asn Val Met Ala Glu Gly
      35           40           45
His Pro Pro Val Asn Leu Gln Leu Trp Asp Thr Ala Gly Gln Glu Asp
      50           55           60
Tyr Lys Lys Leu Arg Pro Leu Ser Tyr Pro Gln Thr Asp Val Phe Leu
      65           70           75           80
Leu Cys Phe Ser Leu Val Tyr Pro Ala Ser Leu Glu Asn Ile Glu Thr
      85           90           95
Met Trp Ile Lys Glu Ile Lys Glu Tyr Cys Pro Asp Lys Pro Tyr Ile
      100           105           110
Leu Val Gly Leu Lys Ser Asp Leu Arg Asp Glu Phe Asp Gln Arg Ala
      115           120           125
Asp Glu Leu Arg Ala Lys Gly Tyr Glu Pro Ile Pro Arg Ala Lys Gly

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130 135 140
 Glu Glu Met Ala Lys Lys Ile Asn Ala Cys Ser Tyr Ile Glu Cys Ser
 145 150 155 160
 Ala Leu Lys Ser Tyr Asn Leu Thr Glu Val Phe Asp Glu Ala Val Lys
 165 170 175
 Tyr Ala Leu Glu Pro Pro Ala Gln Gln Thr Gln Thr Lys Glu Lys Thr
 180 185 190
 Gly Gly Gly Cys Cys Glu Leu Ile
 195 200

<210> 201
 <211> 600
 <212> DNA
 <213> Colletotrichum trifolii

<220>
 <221> CDS
 <222> (1)..(600)

<400> 201
 atg gct caa cca gga gta cag tcg ctg aag tgt gtg gtg acg ggt gac 48
 Met Ala Gln Pro Gly Val Gln Ser Leu Lys Cys Val Val Thr Gly Asp
 1 5 10 15
 ggt gct gtc gga aag aca tgt ttg ctg att tcc tac aca acg aac gcc 96
 Gly Ala Val Gly Lys Thr Cys Leu Leu Ile Ser Tyr Thr Thr Asn Ala
 20 25 30
 ttt cct ggc gag tac att cct act gtc ttc gac aac tac tcg gcg agt 144
 Phe Pro Gly Glu Tyr Ile Pro Thr Val Phe Asp Asn Tyr Ser Ala Ser
 35 40 45
 gta atg gtg gac gga aag cct att agc ttg gga ctg tgg gat act gcc 192
 Val Met Val Asp Gly Lys Pro Ile Ser Leu Gly Leu Trp Asp Thr Ala
 50 55 60
 ggc cag gaa gat tac gac aga ctg cga ccg ctt tcc tac ccc cag acc 240
 Gly Gln Glu Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Gln Thr
 65 70 75 80
 gac gtc ttc ctg att tgc ttc tcc atc gtc agc ccc cca tcg ttt gac 288
 Asp Val Phe Leu Ile Cys Phe Ser Ile Val Ser Pro Pro Ser Phe Asp
 85 90 95
 aac gtc aag gcc aag tgg tac ccc gaa atc gat cat cac gcc ccc aac 336
 Asn Val Lys Ala Lys Trp Tyr Pro Glu Ile Asp His His Ala Pro Asn
 100 105 110
 atc ccc att atc ctc gtc ggc acc aag ctg gat ttg agg gag gat ccc 384
 Ile Pro Ile Ile Leu Val Gly Thr Lys Leu Asp Leu Arg Glu Asp Pro
 115 120 125
 aac acc ctc gag tcc ctc cgc caa aag cgg atg gag ccc gtg tcg tac 432
 Asn Thr Leu Glu Ser Leu Arg Gln Lys Arg Met Glu Pro Val Ser Tyr
 130 135 140
 gat caa gcc ctg atc tgc gcc aag gaa att aag gca cac aaa tac ctg 480
 Asp Gln Ala Leu Ile Cys Ala Lys Glu Ile Lys Ala His Lys Tyr Leu
 145 150 155 160
 gag tgt tct gcc ctg aca cag agg aat ctg aag agc gtt ttt gac gag 528
 Glu Cys Ser Ala Leu Thr Gln Arg Asn Leu Lys Ser Val Phe Asp Glu
 165 170 175
 gcc att cgt gct gtc ctg aac ccc agg ccc gtc gcg cag cag aag aag 576
 Ala Ile Arg Ala Val Leu Asn Pro Arg Pro Val Ala Gln Gln Lys Lys
 180 185 190
 aag tcg aag tgt acg att ttg tga 600
 Lys Ser Lys Cys Thr Ile Leu
 195

<210> 202
 <211> 199
 <212> PRT
 <213> Colletotrichum trifolii

<400> 202
 Met Ala Gln Pro Gly Val Gln Ser Leu Lys Cys Val Val Thr Gly Asp

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1	Gly	Ala	Val	20	5	Lys	Thr	Cys	Leu	25	10	Leu	Ile	Ser	Tyr	Thr	15	Thr	Asn	Ala
	Phe	Pro	Gly	35		Glu	Tyr	Ile	Pro	40		Thr	Val	Phe	Asp	Asn	45	Tyr	Ser	Ala
	Val	Met	Val	50		Asp	Gly	Lys	Pro	55		Ile	Ser	Leu	Gly	Leu	60	Trp	Asp	Thr
	Gly	Gln	Glu	65		Asp	Tyr	Asp	Arg	70		Leu	Arg	Pro	Leu	Ser	75	Tyr	Pro	Gln
	Asp	Val	Phe	85		Leu	Ile	Cys	Phe	90		Ser	Ile	Val	Ser	Pro	95	Pro	Ser	Phe
	Asn	Val	Lys	100		Ala	Lys	Trp	Tyr	105		Pro	Glu	Ile	Asp	His	110	His	Ala	Pro
	Ile	Pro	Ile	115		Ile	Leu	Val	Gly	120		Thr	Lys	Leu	Asp	Leu	125	Arg	Glu	Asp
	Asn	Thr	Leu	130		Glu	Ser	Leu	Arg	135		Gln	Lys	Arg	Met	Glu	140	Pro	Val	Ser
	Asp	Gln	Ala	145		Leu	Ile	Cys	Ala	150		Lys	Glu	Ile	Lys	Ala	155	His	Lys	Tyr
	Glu	Cys	Ser	165		Ala	Leu	Thr	Gln	170		Arg	Asn	Leu	Lys	Ser	175	Val	Phe	Asp
	Ala	Ile	Arg	180		Ala	Val	Leu	Asn	185		Pro	Arg	Pro	Val	Ala	190	Gln	Gln	Lys
	Lys	Ser	Lys	195		Cys	Thr	Ile	Leu											

<210> 203

<211> 618

<212> DNA

<213> Brachydanio rerio

<220>

<221> CDS

<222> (1)..(618)

<400> 203

atg	gca	aac	gga	acc	ggc	agc	atc	atg	ttg	aaa	tgc	gtg	gtc	gtc	ggt	48
Met	Ala	Asn	Gly	Thr	Gly	Ser	Ile	Met	Leu	Lys	Cys	Val	Val	Val	Gly	
1			5						10					15		
gac	ggc	gcc	gtt	gga	aaa	act	tgt	ctg	ttg	atg	agc	tat	gcc	aac	gac	96
Asp	Gly	Ala	Val	Gly	Lys	Thr	Cys	Leu	Leu	Met	Ser	Tyr	Ala	Asn	Asp	
			20						25				30			
gcc	ttt	cca	gag	gaa	tat	gtg	ccc	acc	gtc	ttt	gat	cac	tat	gca	gtg	144
Ala	Phe	Pro	Glu	Glu	Tyr	Val	Pro	Thr	Val	Phe	Asp	His	Tyr	Ala	Val	
			35						40				45			
agt	gtg	acg	gtc	ggg	ggg	aaa	cag	tac	ctg	ctg	ggg	ctc	tat	gac	act	192
Ser	Val	Thr	Val	Gly	Gly	Lys	Gln	Tyr	Leu	Leu	Gly	Leu	Tyr	Asp	Thr	
			50						55				60			
gcg	ggt	cag	gag	gac	tat	gat	cgc	ctg	cga	ccc	ctg	tcc	tat	cct	atg	240
Ala	Gly	Gln	Glu	Asp	Tyr	Asp	Arg	Leu	Arg	Pro	Leu	Ser	Tyr	Pro	Met	
															80	
acg	gat	gtc	ttc	ctc	att	tgc	ttc	tcc	gtg	gtc	aat	ccg	gcc	agc	ttc	288
Thr	Asp	Val	Phe	Leu	Ile	Cys	Phe	Ser	Val	Val	Asn	Pro	Ala	Ser	Phe	
															95	
cag	aat	gta	aga	gag	gaa	tgg	gtc	cct	gag	ctg	cag	gaa	tat	gca	cca	336
Gln	Asn	Val	Arg	Glu	Glu	Trp	Val	Pro	Glu	Leu	Gln	Glu	Tyr	Ala	Pro	
															110	
aac	atc	cct	tac	ctg	ctc	att	ggc	act	cag	att	gac	ctg	cgg	gat	gac	384
Asn	Ile	Pro	Tyr	Leu	Leu	Ile	Gly	Thr	Gln	Ile	Asp	Leu	Arg	Asp	Asp	
															125	
ccc	aag	act	atc	gcc	aag	ctc	aac	gac	gtg	aag	gag	aag	ccc	att	gtg	432
Pro	Lys	Thr	Ile	Ala	Lys	Leu	Asn	Asp	Val	Lys	Glu	Lys	Pro	Ile	Val	
															140	
acg	gaa	caa	ggc	caa	aag	cta	gca	aag	gag	att	ggg	gcc	tgc	tgc	tat	480
Thr	Glu	Gln	Gly	Gln	Lys	Leu	Ala	Lys	Glu	Ile	Gly	Ala	Cys	Cys	Tyr	
															160	
gtt	gaa	tgc	tca	gca	cta	aca	cag	aag	ggc	ctg	aag	act	gtg	ttt	gat	528
Val	Glu	Cys	Ser	Ala	Leu	Thr	Gln	Lys	Gly	Leu	Lys	Thr	Val	Phe	Asp	

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	165		170		175	
gag gcc att ata gcc att ctg gct cct aag aaa ggc gca ctg aag cga						576
Glu Ala Ile Ile Ala Ile Leu Ala Pro Lys Lys Gly Ala Leu Lys Arg						
	180		185		190	
aga cta ggc ccg cgc tgc att aac tgc tgc ctc atc aca tga						618
Arg Leu Gly Pro Arg Cys Ile Asn Cys Cys Leu Ile Thr						
	195		200		205	

<210> 204

<211> 205

<212> PRT

<213> Brachydanio rerio

<400> 204

Met Ala Asn Gly Thr Gly Ser Ile Met Leu Lys Cys Val Val Val Gly	
1 5 10 15	
Asp Gly Ala Val Gly Lys Thr Cys Leu Met Ser Tyr Ala Asn Asp	
20 25 30	
Ala Phe Pro Glu Glu Tyr Val Pro Thr Val Phe Asp His Tyr Ala Val	
35 40 45	
Ser Val Thr Val Gly Gly Lys Gln Tyr Leu Leu Gly Leu Tyr Asp Thr	
50 55 60	
Ala Gly Gln Glu Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Met	
65 70 75 80	
Thr Asp Val Phe Leu Ile Cys Phe Ser Val Val Asn Pro Ala Ser Phe	
85 90 95	
Gln Asn Val Arg Glu Glu Trp Val Pro Glu Leu Gln Glu Tyr Ala Pro	
100 105 110	
Asn Ile Pro Tyr Leu Leu Ile Gly Thr Gln Ile Asp Leu Arg Asp Asp	
115 120 125	
Pro Lys Thr Ile Ala Lys Leu Asn Asp Val Lys Glu Lys Pro Ile Val	
130 135 140	
Thr Glu Gln Gly Gln Lys Leu Ala Lys Glu Ile Gly Ala Cys Cys Tyr	
145 150 155 160	
Val Glu Cys Ser Ala Leu Thr Gln Lys Gly Leu Lys Thr Val Phe Asp	
165 170 175	
Glu Ala Ile Ile Ala Ile Leu Ala Pro Lys Lys Gly Ala Leu Lys Arg	
180 185 190	
Arg Leu Gly Pro Arg Cys Ile Asn Cys Cys Leu Ile Thr	
195 200 205	

<210> 205

<211> 582

<212> DNA

<213> Xenopus laevis

<220>

<221> CDS

<222> (1)..(582)

<400> 205

atg gca gcg att cgg aaa aag ctg gtg att gtt gga gat ggt gcc tgt		48
Met Ala Ala Ile Arg Lys Lys Leu Val Ile Val Gly Asp Gly Ala Cys		
1 5 10 15		
ggg aag acc tgc ctg ctc att gta ttc agc aag gat cag ttc cct gag		96
Gly Lys Thr Cys Leu Leu Ile Val Phe Ser Lys Asp Gln Phe Pro Glu		
20 25 30		
gtt tat gtc cca act gtc ttt gag aac tac att gcc gat ata gaa gtc		144
Val Tyr Val Pro Thr Val Phe Glu Asn Tyr Ile Ala Asp Ile Glu Val		
35 40 45		
gat gga aaa cag gtg gaa ctg gct ctg tgg gac aca gca gga cag gag		192
Asp Gly Lys Gln Val Glu Leu Ala Leu Trp Asp Thr Ala Gly Gln Glu		
50 55 60		
gat tat gac agg cta cgc cca ctt tct tac cct gat act gat gtg att		240
Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Asp Thr Asp Val Ile		
65 70 75 80		
ttg atg tgt ttc tca att gac agc cct gac agt tta gag aat att cct		288

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Leu Met Cys Phe Ser Ile Asp Ser Pro Asp Ser Leu Glu Asn Ile Pro
      85                      90                      95
gag aaa tgg act cca gaa gtg aag cat ttc tgt ccc aat gta ccc att      336
Glu Lys Trp Thr Pro Glu Val Lys His Phe Cys Pro Asn Val Pro Ile
      100                      105                      110
att ctt gtc ggt aac aaa aag gat cta aga aat gat gaa cac act aga      384
Ile Leu Val Gly Asn Lys Lys Asp Leu Arg Asn Asp Glu His Thr Arg
      115                      120                      125
aga gag ctg aca aag atg aag cag gag cca gtt aaa cca gaa gat ggc      432
Arg Glu Leu Thr Lys Met Lys Gln Glu Pro Val Lys Pro Glu Asp Gly
      130                      135                      140
aga gaa atg gcc aac aga atc aat gca ttt ggc tac ctg gaa tgt tct      480
Arg Glu Met Ala Asn Arg Ile Asn Ala Phe Gly Tyr Leu Glu Cys Ser
      145                      150                      155                      160
gct aag aca aag gat ggc gtg aga gaa gtt ttt gaa atg gct aca cgg      528
Ala Lys Thr Lys Asp Gly Val Arg Glu Val Phe Glu Met Ala Thr Arg
      165                      170                      175
gct gcc ttg caa gtt agg aaa cac aga aag aag caa cgt tgt tct att      576
Ala Ala Leu Gln Val Arg Lys His Arg Lys Lys Gln Arg Cys Ser Ile
      180                      185                      190
cta taa
Leu
      582

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<210> 206
 <211> 193
 <212> PRT
 <213> *Xenopus laevis*

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<400> 206
Met Ala Ala Ile Arg Lys Lys Leu Val Ile Val Gly Asp Gly Ala Cys
1      5      10      15
Gly Lys Thr Cys Leu Leu Ile Val Phe Ser Lys Asp Gln Phe Pro Glu
      20      25      30
Val Tyr Val Pro Thr Val Phe Glu Asn Tyr Ile Ala Asp Ile Glu Val
      35      40      45
Asp Gly Lys Gln Val Glu Leu Ala Leu Trp Asp Thr Ala Gly Gln Glu
      50      55      60
Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Asp Thr Asp Val Ile
      65      70      75      80
Leu Met Cys Phe Ser Ile Asp Ser Pro Asp Ser Leu Glu Asn Ile Pro
      85      90      95
Glu Lys Trp Thr Pro Glu Val Lys His Phe Cys Pro Asn Val Pro Ile
      100      105      110
Ile Leu Val Gly Asn Lys Lys Asp Leu Arg Asn Asp Glu His Thr Arg
      115      120      125
Arg Glu Leu Thr Lys Met Lys Gln Glu Pro Val Lys Pro Glu Asp Gly
      130      135      140
Arg Glu Met Ala Asn Arg Ile Asn Ala Phe Gly Tyr Leu Glu Cys Ser
      145      150      155      160
Ala Lys Thr Lys Asp Gly Val Arg Glu Val Phe Glu Met Ala Thr Arg
      165      170      175
Ala Ala Leu Gln Val Arg Lys His Arg Lys Lys Gln Arg Cys Ser Ile
      180      185      190
Leu

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<210> 207
 <211> 1092
 <212> DNA
 <213> *Xenopus laevis*

<220>
 <221> CDS
 <222> (25)..(606)

<400> 207

ggagggagct gcgagtagga aggc	atg gca gcc ata agg aag aag ctg gtg	51
	Met Ala Ala Ile Arg Lys Lys Leu Val	
	1 5	
att gtg ggc gac ggg gcg tgt ggc aag act tgt ctc ctc atc gtc ttt		99
Ile Val Gly Asp Gly Ala Cys Gly Lys Thr Cys Leu Leu Ile Val Phe		
10 15 20 25		
agc aaa gac cag ttc cca gag gtc tat gtt ccc acc gtc ttt gag aac		147
Ser Lys Asp Gln Phe Pro Glu Val Tyr Val Pro Thr Val Phe Glu Asn		
30 35 40		
tac gtg gcc gac atc gag gtg gac tcc aag cag gta gaa ctg gct ctg		195
Tyr Val Ala Asp Ile Glu Val Asp Ser Lys Gln Val Glu Leu Ala Leu		
45 50 55		
tgg gac acg gct ggg caa gag gat tac gac cga ctg aga ccc ctc tcc		243
Trp Asp Thr Ala Gly Gln Glu Asp Tyr Asp Arg Leu Arg Pro Leu Ser		
60 65 70		
tac cct gac aca gac gtc atc ctc atg tgt ttc tcc atc gac agc ccc		291
Tyr Pro Asp Thr Asp Val Ile Leu Met Cys Phe Ser Ile Asp Ser Pro		
75 80 85		
gac agt ttg gaa aat atc cct gag aaa tgg acc cca gaa gtg aaa cat		339
Asp Ser Leu Glu Asn Ile Pro Glu Lys Trp Thr Pro Glu Val Lys His		
90 95 100 105		
ttc tgc ccc aat gtg cca ata atc ctg gtg gga aac aag aag gat ctg		387
Phe Cys Pro Asn Val Pro Ile Ile Leu Val Gly Asn Lys Lys Asp Leu		
110 115 120		
cgg aat gac gag cac acg cgc cgg gag ttg gcc aaa atg aag cag gag		435
Arg Asn Asp Glu His Thr Arg Arg Glu Leu Ala Lys Met Lys Gln Glu		
125 130 135		
cca gta aga gca gag gag gga agg gac atg gcc aat cga atc agc gcc		483
Pro Val Arg Ala Glu Glu Gly Arg Asp Met Ala Asn Arg Ile Ser Ala		
140 145 150		
ttt ggc tac ttg gag tgc tct gcc aag acc aag gat ggc gta aga gaa		531
Phe Gly Tyr Leu Glu Cys Ser Ala Lys Thr Lys Asp Gly Val Arg Glu		
155 160 165		
gtg ttt gag atg gcg act cgg gcg gct ctg cag gcc aaa cgt ggg cgc		579
Val Phe Glu Met Ala Thr Arg Ala Ala Leu Gln Ala Lys Arg Gly Arg		
170 175 180 185		
aag agg agc acc tgc cag tta ctg tgaggagaga agccccatgc cctcattctc		633
Lys Arg Ser Thr Cys Gln Leu Leu		
190		
ccccctccct gtgccctctc tctccgctgt gggctagggg agctgcggac tgaggagacg		693
caccaataac caatcccttt cctgtttctca tgggcagcgc caggccccga gtccagcaaa		753
tcacatcagt gccaggctctg tagcaacagg gggtttctta caacagtgcc attgtctagt		813
gcagggcccc ttctctataa aggcgggggg gggattattt ggctttagaa ggccccgctg		873
tcctgggggt cggattgtac acacgagagc gggacccttc gtgatattgg ttaattccac		933
cccgaccctg tgctggcgag ggttaatcct gcagctcatg agaggggtgg ggaggtttta		993
taataatggt gtccctgctt gaatgacatt ttattgtcca ttgtactcga gtatcaacca		1053
ataaactttg tagccatggt tagtaaaaaa aaaaaaaaaa		1092

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<210> 208
<211> 193
<212> PRT
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<213> *Xenopus laevis*

<400> 208

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Met Ala Ala Ile Arg Lys Lys Leu Val Ile Val Gly Asp Gly Ala Cys
1          5          10          15
Gly Lys Thr Cys Leu Leu Ile Val Phe Ser Lys Asp Gln Phe Pro Glu
20          25          30
Val Tyr Val Pro Thr Val Phe Glu Asn Tyr Val Ala Asp Ile Glu Val
35          40          45
Asp Ser Lys Gln Val Glu Leu Ala Leu Trp Asp Thr Ala Gly Gln Glu
50          55          60
Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Asp Thr Asp Val Ile
65          70          75          80
Leu Met Cys Phe Ser Ile Asp Ser Pro Asp Ser Leu Glu Asn Ile Pro
85          90          95
Glu Lys Trp Thr Pro Glu Val Lys His Phe Cys Pro Asn Val Pro Ile
100         105         110
Ile Leu Val Gly Asn Lys Lys Asp Leu Arg Asn Asp Glu His Thr Arg
115         120         125
Arg Glu Leu Ala Lys Met Lys Gln Glu Pro Val Arg Ala Glu Glu Gly
130         135         140
Arg Asp Met Ala Asn Arg Ile Ser Ala Phe Gly Tyr Leu Glu Cys Ser
145         150         155         160
Ala Lys Thr Lys Asp Gly Val Arg Glu Val Phe Glu Met Ala Thr Arg
165         170         175
Ala Ala Leu Gln Ala Lys Arg Gly Arg Lys Arg Ser Thr Cys Gln Leu
180         185         190
Leu

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<210> 209

<211> 582

<212> DNA

<213> *Brachydanio rerio*

<220>

<221> CDS

<222> (1) .. (582)

<400> 209

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atg gca gca att cgc aag aag ctg gtg att gta gga gat gga gca tgc      48
Met Ala Ala Ile Arg Lys Lys Leu Val Ile Val Gly Asp Gly Ala Cys
1          5          10          15
ggg aaa aca tgt ttg ctt att gtg ttc agt aaa gac cag ttt cct gaa      96
Gly Lys Thr Cys Leu Leu Ile Val Phe Ser Lys Asp Gln Phe Pro Glu
20          25          30
gtc tac gta cca aca gtg ttt gaa aac tat gtt gcc gac att gaa gtt      144
Val Tyr Val Pro Thr Val Phe Glu Asn Tyr Val Ala Asp Ile Glu Val
35          40          45
gac agc aaa cag gtg gaa ctc gct ctg tgg gat act gca ggg cag gag      192
Asp Ser Lys Gln Val Glu Leu Ala Leu Trp Asp Thr Ala Gly Gln Glu
50          55          60
gac tac gac agg ctt cgt cct ctt tca tac cca gac acc gat gtc att      240
Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Asp Thr Asp Val Ile
65          70          75          80
ctt atg tgt ttc tct att gac agt cct gac agt tta gag aat att ccg      288
Leu Met Cys Phe Ser Ile Asp Ser Pro Asp Ser Leu Glu Asn Ile Pro
85          90          95
gag aag tgg acg cct gag gtc aaa cac ttt tgt cca aac gct cca atc      336
Glu Lys Trp Thr Pro Glu Val Lys His Phe Cys Pro Asn Ala Pro Ile
100         105         110
atc ctt gtg gga aac aaa aaa gac ctg cgc aat gat gaa cac aca cgc      384
Ile Leu Val Gly Asn Lys Lys Asp Leu Arg Asn Asp Glu His Thr Arg
115         120         125
agg gaa ctg acc aag atg aag cag gag cca gtt aaa gca gag gaa ggg      432
Arg Glu Leu Thr Lys Met Lys Gln Glu Pro Val Lys Ala Glu Glu Gly
130         135         140
aga gac atg gcc aat cga att gga gca ttt ggt tat atg gaa tgt tct      480

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Arg Asp Met Ala Asn Arg Ile Gly Ala Phe Gly Tyr Met Glu Cys Ser
 145 150 155 160
 gcc aaa aca aaa gac ggt gtt cgg gag gtg ttt gaa atg gcc act aga 528
 Ala Lys Thr Lys Asp Gly Val Arg Glu Val Phe Glu Met Ala Thr Arg
 165 170 175
 gcg gcg ctg cag gca cgc agg gga aag aag agc aac aaa tgc tgt ctg 576
 Ala Ala Leu Gln Ala Arg Arg Gly Lys Lys Ser Asn Lys Cys Cys Leu
 180 185 190
 ctg tga 582
 Leu

<210> 210

<211> 193

<212> PRT

<213> Brachydanio rerio

<400> 210

Met Ala Ala Ile Arg Lys Lys Leu Val Ile Val Gly Asp Gly Ala Cys
 1 5 10 15
 Gly Lys Thr Cys Leu Leu Ile Val Phe Ser Lys Asp Gln Phe Pro Glu
 20 25 30
 Val Tyr Val Pro Thr Val Phe Glu Asn Tyr Val Ala Asp Ile Glu Val
 35 40 45
 Asp Ser Lys Gln Val Glu Leu Ala Leu Trp Asp Thr Ala Gly Gln Glu
 50 55 60
 Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Asp Thr Asp Val Ile
 65 70 75 80
 Leu Met Cys Phe Ser Ile Asp Ser Pro Asp Ser Leu Glu Asn Ile Pro
 85 90 95
 Glu Lys Trp Thr Pro Glu Val Lys His Phe Cys Pro Asn Ala Pro Ile
 100 105 110
 Ile Leu Val Gly Asn Lys Lys Asp Leu Arg Asn Asp Glu His Thr Arg
 115 120 125
 Arg Glu Leu Thr Lys Met Lys Gln Glu Pro Val Lys Ala Glu Glu Gly
 130 135 140
 Arg Asp Met Ala Asn Arg Ile Gly Ala Phe Gly Tyr Met Glu Cys Ser
 145 150 155 160
 Ala Lys Thr Lys Asp Gly Val Arg Glu Val Phe Glu Met Ala Thr Arg
 165 170 175
 Ala Ala Leu Gln Ala Arg Arg Gly Lys Lys Ser Asn Lys Cys Cys Leu
 180 185 190
 Leu

<210> 211

<211> 576

<212> DNA

<213> Brachydanio rerio

<220>

<221> CDS

<222> (1)..(576)

<400> 211

atg cag agc atc aag tgt gtg gtg gga gac gga gcg gtg gga aaa 48
 Met Gln Ser Ile Lys Cys Val Val Val Gly Asp Gly Ala Val Gly Lys
 1 5 10 15
 acc tgc ctg ctc atc tcc tac acg acc ggc gcc ttc ccc aaa gag tac 96
 Thr Cys Leu Leu Ile Ser Tyr Thr Thr Gly Ala Phe Pro Lys Glu Tyr
 20 25 30
 att ccc acc gtc ttc gac aac tac agc tcc cag gtc agc gtg gac aac 144
 Ile Pro Thr Val Phe Asp Asn Tyr Ser Ser Gln Val Ser Val Asp Asn
 35 40 45
 cgt acc gtc agc ctc aat ctg tgg gac acc gcg ggt cag gag gag tac 192
 Arg Thr Val Ser Leu Asn Leu Trp Asp Thr Ala Gly Gln Glu Glu Tyr
 50 55 60

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gac cgc ctt cgc acg ctg tcc tat cct caa acc aac gtc ttc atc atc      240
Asp Arg Leu Arg Thr Leu Ser Tyr Pro Gln Thr Asn Val Phe Ile Ile
65      70      75      80
tgc ttc tcc atc tcc agc cct ccg tcc tac gag aac atc aag cat aag      288
Cys Phe Ser Ile Ser Ser Pro Pro Ser Tyr Glu Asn Ile Lys His Lys
85      90      95
tgg cac ccg gag gtg aca cac cac tgt cct agc gtg ccc atc ctg ctt      336
Trp His Pro Glu Val Thr His His Cys Pro Ser Val Pro Ile Leu Leu
100      105      110
gtg gga acc aag agt gat ctc cgc aat gac gcc gac gtg ctg aag aag      384
Val Gly Thr Lys Ser Asp Leu Arg Asn Asp Ala Asp Val Leu Lys Lys
115      120      125
ctg aag gag cag aac cag gcg ccc atc acg acc cag cag ggt caa gcg      432
Leu Lys Glu Gln Asn Gln Ala Pro Ile Thr Thr Gln Gln Gly Gln Ala
130      135      140
ctg gct cgc caa atc cac gcc gtc aag tac cgt gag tgt tcg gca ctc      480
Leu Ala Arg Gln Ile His Ala Val Lys Tyr Arg Glu Cys Ser Ala Leu
145      150      155      160
agt cag gac ggc atc aag gac gtg ttt gca gac gca gtg cgt gcc tac      528
Ser Gln Asp Gly Ile Lys Asp Val Phe Ala Asp Ala Val Arg Ala Tyr
165      170      175
ctt agt cct caa ccc gtg gct aac aag aag ccc tgt ata ctc ctc      573
Leu Ser Pro Gln Pro Val Ala Asn Lys Lys Pro Cys Ile Leu Leu
180      185      190
tga
576

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<210> 212

<211> 191

<212> PRT :

<213> Brachydanio rerio

<400> 212

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Met Gln Ser Ile Lys Cys Val Val Val Gly Asp Gly Ala Val Gly Lys
1      5      10      15
Thr Cys Leu Leu Ile Ser Tyr Thr Thr Gly Ala Phe Pro Lys Glu Tyr
20      25      30
Ile Pro Thr Val Phe Asp Asn Tyr Ser Ser Gln Val Ser Val Asp Asn
35      40      45
Arg Thr Val Ser Leu Asn Leu Trp Asp Thr Ala Gly Gln Glu Glu Tyr
50      55      60
Asp Arg Leu Arg Thr Leu Ser Tyr Pro Gln Thr Asn Val Phe Ile Ile
65      70      75      80
Cys Phe Ser Ile Ser Ser Pro Pro Ser Tyr Glu Asn Ile Lys His Lys
85      90      95
Trp His Pro Glu Val Thr His His Cys Pro Ser Val Pro Ile Leu Leu
100      105      110
Val Gly Thr Lys Ser Asp Leu Arg Asn Asp Ala Asp Val Leu Lys Lys
115      120      125
Leu Lys Glu Gln Asn Gln Ala Pro Ile Thr Thr Gln Gln Gly Gln Ala
130      135      140
Leu Ala Arg Gln Ile His Ala Val Lys Tyr Arg Glu Cys Ser Ala Leu
145      150      155      160
Ser Gln Asp Gly Ile Lys Asp Val Phe Ala Asp Ala Val Arg Ala Tyr
165      170      175
Leu Ser Pro Gln Pro Val Ala Asn Lys Lys Pro Cys Ile Leu Leu
180      185      190

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<210> 213

<211> 576

<212> DNA

<213> Brachydanio rerio

<220>

<221> CDS

<222> (1) .. (576)

<400> 213
 atg cag acc ata aag tgt gtt gtt gtt ggt gat ggt gca gtg gga aag 48
 Met Gln Thr Ile Lys Cys Val Val Val Gly Asp Gly Ala Val Gly Lys
 1 5 10 15
 acc tgt ctg ttg atc tcc tac acc acc aat gcc ttc cca gac gag tac 96
 Thr Cys Leu Leu Ile Ser Tyr Thr Thr Asn Ala Phe Pro Asp Glu Tyr
 20 25 30
 att cct aca gtg ttc gac aac tac agc act caa acc tgt gtg gac ggc 144
 Ile Pro Thr Val Phe Asp Asn Tyr Ser Thr Gln Thr Cys Val Asp Gly
 35 40 45
 cgt gct gtc agc ctc aac ctg tgg gac acc gcc ggt cag gag gag tac 192
 Arg Ala Val Ser Leu Asn Leu Trp Asp Thr Ala Gly Gln Glu Glu Tyr
 50 55 60
 gac cgc ctg cga acc ctc tcc tac ccg cag aca cac gtc ttc atc atc 240
 Asp Arg Leu Arg Thr Leu Ser Tyr Pro Gln Thr His Val Phe Ile Ile
 65 70 75 80
 tgt ttc tct gtg gct agt cct tcc tct cac gcc aac gtc agg cat aaa 288
 Cys Phe Ser Val Ala Ser Pro Ser Ser His Ala Asn Val Arg His Lys
 85 90 95
 tgg cac ccg gag gtc tgc cac cac tgt cct ggc gta cct gtg ctg ctg 336
 Trp His Pro Glu Val Cys His His Cys Pro Gly Val Pro Val Leu Leu
 100 105 110
 gtg ggc acc aag aga gac ctg cga ggg gac aag gag acc ctg gag aag 384
 Val Gly Thr Lys Arg Asp Leu Arg Gly Asp Lys Glu Thr Leu Glu Lys
 115 120 125
 ctg aag gag cag ggg atg agt ccg acc act cca cag caa ggc agt gca 432
 Leu Lys Glu Gln Gly Met Ser Pro Thr Thr Pro Gln Gln Gly Ser Ala
 130 135 140
 ctg gcc cgc agc atc ggg gcg gtg cga tat ctg gag tgc tcg gcc ctt 480
 Leu Ala Arg Ser Ile Gly Ala Val Arg Tyr Leu Glu Cys Ser Ala Leu
 145 150 155 160
 ctc cag gag ggc gtc cga gag gtc ttc aac gaa gca gtt agg gct gtt 528
 Leu Gln Glu Gly Val Arg Glu Val Phe Asn Glu Ala Val Arg Ala Val
 165 170 175
 ctc tac ccc aac gcc aag aag cac acc aaa aaa tgt gtg ctg ctt 573
 Leu Tyr Pro Asn Ala Lys Lys His Thr Lys Lys Cys Val Leu Leu
 180 185 190
 taa 576

<210> 214

<211> 191

<212> PRT

<213> Brachydanio rerio

<400> 214

Met Gln Thr Ile Lys Cys Val Val Val Gly Asp Gly Ala Val Gly Lys
 1 5 10 15
 Thr Cys Leu Leu Ile Ser Tyr Thr Thr Asn Ala Phe Pro Asp Glu Tyr
 20 25 30
 Ile Pro Thr Val Phe Asp Asn Tyr Ser Thr Gln Thr Cys Val Asp Gly
 35 40 45
 Arg Ala Val Ser Leu Asn Leu Trp Asp Thr Ala Gly Gln Glu Glu Tyr
 50 55 60
 Asp Arg Leu Arg Thr Leu Ser Tyr Pro Gln Thr His Val Phe Ile Ile
 65 70 75 80
 Cys Phe Ser Val Ala Ser Pro Ser Ser His Ala Asn Val Arg His Lys
 85 90 95
 Trp His Pro Glu Val Cys His His Cys Pro Gly Val Pro Val Leu Leu
 100 105 110
 Val Gly Thr Lys Arg Asp Leu Arg Gly Asp Lys Glu Thr Leu Glu Lys
 115 120 125
 Leu Lys Glu Gln Gly Met Ser Pro Thr Thr Pro Gln Gln Gly Ser Ala
 130 135 140
 Leu Ala Arg Ser Ile Gly Ala Val Arg Tyr Leu Glu Cys Ser Ala Leu

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145 150 155 160
 Leu Gln Glu Gly Val Arg Glu Val Phe Asn Glu Ala Val Arg Ala Val
 165 170 175
 Leu Tyr Pro Asn Ala Lys Lys His Thr Lys Lys Cys Val Leu Leu
 180 185 190

<210> 215
 <211> 1124
 <212> DNA
 <213> Rattus norvegicus

<220>
 <221> CDS
 <222> (100)..(684)

<400> 215
 aggtggtggc tcaggatagg tgtcctctgc actaataggc ctacctgggt gtagtctgac 60
 agcctgtggt ctgagaagtc ccagggtgctt tgtacagca atg gct gcc atc cgg 114
 Met Ala Ala Ile Arg
 1 5
 aag aaa ctg gtg att gtg gga gat gga gct tgt gga aaa aca tgc ttg 162
 Lys Lys Leu Val Ile Val Gly Asp Gly Ala Cys Gly Lys Thr Cys Leu
 10 15 20
 ctc atc gtc ttc agc aag gac cag ttt cct gat gtt tat gtg ccc aca 210
 Leu Ile Val Phe Ser Lys Asp Gln Phe Pro Asp Val Tyr Val Pro Thr
 25 30 35
 gtg ttt gag aac tat gtg gct gat atc gaa gtg gat gga aaa cag gtg 258
 Val Phe Glu Asn Tyr Val Ala Asp Ile Glu Val Asp Gly Lys Gln Val
 40 45 50
 gag ttg gcc ctc tgg gac aca gct ggt caa gaa gat tat gat cgc ttg 306
 Glu Leu Ala Leu Trp Asp Thr Ala Gly Gln Glu Asp Tyr Asp Arg Leu
 55 60 65
 agg cca ctc tcc tat ccg gac act gat gtc ctc ttg ata tgt ttc tcc 354
 Arg Pro Leu Ser Tyr Pro Asp Thr Asp Val Leu Leu Ile Cys Phe Ser
 70 75 80 85
 att ggc aac cct gat agc ttt ggg aac atc cca cac aaa tgg ata cca 402
 Ile Gly Asn Pro Asp Ser Phe Gly Asn Ile Pro His Lys Trp Ile Pro
 90 95 100
 gaa gta aag cat ttc tgt ccc aac gtg ccc atc atc ctg gtc ggg agc 450
 Glu Val Lys His Phe Cys Pro Asn Val Pro Ile Ile Leu Val Gly Ser
 105 110 115
 aag aag gat ctt cgg aat gac ttg aac aca ata caa gag tta gcc aag 498
 Lys Lys Asp Leu Arg Asn Asp Leu Asn Thr Ile Gln Glu Leu Ala Lys
 120 125 130
 agg aaa caa gag ccg gtg aaa cct gaa caa ggc cga gat ttg gcg aac 546
 Arg Lys Gln Glu Pro Val Lys Pro Glu Gln Gly Arg Asp Leu Ala Asn
 135 140 145
 agc att ggc gct ttc gag tat gtg gag tgt tct gca aag acc aaa gat 594
 Ser Ile Gly Ala Phe Glu Tyr Val Glu Cys Ser Ala Lys Thr Lys Asp
 150 155 160 165
 gga gtg aga aag gtc ttt gaa aaa agc cac caa ggc ttg ctc ttg caa 642
 Gly Val Arg Lys Val Phe Glu Lys Ser His Gln Gly Leu Leu Leu Gln
 170 175 180
 acg aac cgt gtg aag aaa aag act ggc tgc ttt gtc ttt tgaagtcttt 691
 Thr Asn Arg Val Lys Lys Lys Thr Gly Cys Phe Val Phe
 185 190
 gtgcaaacac agccctagta cagttaattt tcaagtgcta tttacgaatg ttattgtgta 751
 attgctagcc tttttgttta tttatatatc caagattaca ggtcagaagt catcttgcta 811
 ctaatgtttg gaaatcaact gtgattatta atgacattca ttctgtctga ccttccaggg 871
 tcctgactct tctgtaacag accattctgc atttcacctg aaacccaagg cactaattga 931

agaacttatt atctgtagaa agagagatgg taacttcacg atttagactg taactacttt 991

ctgaccacccc taccateccat atatgagctg agaagaaagc tgttgagtca ccacttgagt 1051

gtttgctccc taacaacttt aatcaccatc cttattctct tcgaaatgtc tctccaggca 1111

gctgtggtag agt 1124

<210> 216
 <211> i94
 <212> PRT
 <213> Rattus norvegicus

<400> 216
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 1 5 10 15
 Gly Lys Thr Cys Leu Leu Ile Val Phe Ser Lys Asp Gln Phe Pro Asp
 20 25 30
 Val Tyr Val Pro Thr Val Phe Glu Asn Tyr Val Ala Asp Ile Glu Val
 35 40 45
 Asp Gly Lys Gln Val Glu Leu Ala Leu Trp Asp Thr Ala Gly Gln Glu
 50 55 60
 Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Asp Thr Asp Val Leu
 65 70 75 80
 Leu Ile Cys Phe Ser Ile Gly Asn Pro Asp Ser Phe Gly Asn Ile Pro
 85 90 95
 His Lys Trp Ile Pro Glu Val Lys His Phe Cys Pro Asn Val Pro Ile
 100 105 110
 Ile Leu Val Gly Ser Lys Lys Asp Leu Arg Asn Asp Leu Asn Thr Ile
 115 120 125
 Gln Glu Leu Ala Lys Arg Lys Gln Glu Pro Val Lys Pro Glu Gln Gly
 130 135 140
 Arg Asp Leu Ala Asn Ser Ile Gly Ala Phe Glu Tyr Val Glu Cys Ser
 145 150 155 160
 Ala Lys Thr Lys Asp Gly Val Arg Lys Val Phe Glu Lys Ser His Gln
 165 170 175
 Gly Leu Leu Leu Gln Thr Asn Arg Val Lys Lys Lys Thr Gly Cys Phe
 180 185 190
 Val Phe

<210> 217
 <211> 576
 <212> DNA
 <213> Aplysia californica

<220>
 <221> CDS
 <222> (1)..(576)

<400> 217
 atg caa acc ata aag tgt gtg gtt gtg ggg gat ggg gca gtc gga aaa 48
 Met Gln Thr Ile Lys Cys Val Val Val Gly Asp Gly Ala Val Gly Lys
 1 5 10 15
 acc tgc ctt ctc att tca tac acc aca aat aaa ttt cct tca gaa tat 96
 Thr Cys Leu Leu Ile Ser Tyr Thr Thr Asn Lys Phe Pro Ser Glu Tyr
 20 25 30
 gtg cca aca gtg ttt gac aac tat gcg gtg acc gtg atg atc ggg gga 144
 Val Pro Thr Val Phe Asp Asn Tyr Ala Val Thr Val Met Ile Gly Gly
 35 40 45

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gag	ccc	tac	acc	ctg	ggc	ctg	ttt	gat	acc	gcg	ggg	cag	gag	gac	tac	192
Glu	Pro	Tyr	Thr	Leu	Gly	Leu	Phe	Asp	Thr	Ala	Gly	Gln	Glu	Asp	Tyr	
50					55					60						
gac	agg	cta	cgt	cca	ctc	agc	tac	cct	cag	acg	gac	gtc	ttc	ctc	gtc	240
Asp	Arg	Leu	Arg	Pro	Leu	Ser	Tyr	Pro	Gln	Thr	Asp	Val	Phe	Leu	Val	
65					70					75					80	
tgc	ttc	tcc	gtg	gtc	acc	ccg	tcc	tcc	ttc	gag	aat	gtc	agg	gaa	aag	288
Cys	Phe	Ser	Val	Val	Thr	Pro	Ser	Ser	Phe	Glu	Asn	Val	Arg	Glu	Lys	
					85				90					95		
tgg	gtt	ccg	gag	atc	aca	cat	cac	tgt	cag	cgc	acg	ccg	ttc	ctg	ctg	336
Trp	Val	Pro	Glu	Ile	Thr	His	His	Cys	Gln	Arg	Thr	Pro	Phe	Leu	Leu	
					100				105					110		
gtg	ggg	aca	cag	att	gat	ctg	cgc	gac	gac	acg	ccc	acg	gtg	gag	aag	384
Val	Gly	Thr	Gln	Ile	Asp	Leu	Arg	Asp	Asp	Thr	Pro	Thr	Val	Glu	Lys	
					115				120					125		
ctg	gcc	aag	aac	aaa	cag	aag	ccc	atc	acc	gcc	gac	cac	ggg	gag	cgt	432
Leu	Ala	Lys	Asn	Lys	Gln	Lys	Pro	Ile	Thr	Ala	Asp	His	Gly	Glu	Arg	
					130					140						
ctg	gcc	cgc	gag	ctc	agg	gcg	gtc	aag	tac	gtc	gag	tgc	tcc	gcc	ctc	480
Leu	Ala	Arg	Glu	Leu	Arg	Ala	Val	Lys	Tyr	Val	Glu	Cys	Ser	Ala	Leu	
					145					155					160	
aac	cag	aga	ggg	ctg	aag	aac	gtg	ttt	gat	gag	gct	atc	ctg	gca	gcg	528
Asn	Gln	Arg	Gly	Leu	Lys	Asn	Val	Phe	Asp	Glu	Ala	Ile	Leu	Ala	Ala	
					165					170					175	
cta	gaa	ccc	cca	gag	cca	ccc	aag	aaa	aag	aaa	tgt	gtg	ctc	ttg		573
Leu	Glu	Pro	Pro	Glu	Pro	Pro	Lys	Lys	Lys	Lys	Cys	Val	Leu	Leu		
					180					185				190		
taa																576

<210> 218

<211> 191

<212> PRT

<213> *Aplysia californica*

<400> 218

Met	Gln	Thr	Ile	Lys	Cys	Val	Val	Val	Gly	Asp	Gly	Ala	Val	Gly	Lys	
1				5					10					15		
Thr	Cys	Leu	Leu	Ile	Ser	Tyr	Thr	Thr	Asn	Lys	Phe	Pro	Ser	Glu	Tyr	
				20				25					30			
Val	Pro	Thr	Val	Phe	Asp	Asn	Tyr	Ala	Val	Thr	Val	Met	Ile	Gly	Gly	
				35			40				45					
Glu	Pro	Tyr	Thr	Leu	Gly	Leu	Phe	Asp	Thr	Ala	Gly	Gln	Glu	Asp	Tyr	
				50		55				60						
Asp	Arg	Leu	Arg	Pro	Leu	Ser	Tyr	Pro	Gln	Thr	Asp	Val	Phe	Leu	Val	
65					70					75					80	
Cys	Phe	Ser	Val	Val	Thr	Pro	Ser	Ser	Phe	Glu	Asn	Val	Arg	Glu	Lys	
				85					90					95		
Trp	Val	Pro	Glu	Ile	Thr	His	His	Cys	Gln	Arg	Thr	Pro	Phe	Leu	Leu	
				100				105						110		
Val	Gly	Thr	Gln	Ile	Asp	Leu	Arg	Asp	Asp	Thr	Pro	Thr	Val	Glu	Lys	
				115			120							125		
Leu	Ala	Lys	Asn	Lys	Gln	Lys	Pro	Ile	Thr	Ala	Asp	His	Gly	Glu	Arg	
				130		135				140						
Leu	Ala	Arg	Glu	Leu	Arg	Ala	Val	Lys	Tyr	Val	Glu	Cys	Ser	Ala	Leu	
145					150					155					160	
Asn	Gln	Arg	Gly	Leu	Lys	Asn	Val	Phe	Asp	Glu	Ala	Ile	Leu	Ala	Ala	
				165					170						175	
Leu	Glu	Pro	Pro	Glu	Pro	Pro	Lys	Lys	Lys	Lys	Cys	Val	Leu	Leu		
				180				185						190		

<210> 219

<211> 579

<212> DNA

<213> *Aplysia californica*

<220>

<221> CDS

<222> (1)..(579)

<400> 219

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atg cag gct atc aag tgt gtg gta gtc ggg gac ggt gct gtg ggt aag      48
Met Gln Ala Ile Lys Cys Val Val Val Gly Asp Gly Ala Val Gly Lys
1          5          10          15
aca tgt ctt ctt atc agc tac act acc aat gcc ttc ccc gga gaa tac      96
Thr Cys Leu Leu Ile Ser Tyr Thr Thr Asn Ala Phe Pro Gly Glu Tyr
          20          25          30
att cca act gtc ttt gac aac tac tct gca aat gtt atg gta gat ggc      144
Ile Pro Thr Val Phe Asp Asn Tyr Ser Ala Asn Val Met Val Asp Gly
          35          40          45
aag cca atc aat ctt gga cta tgg gat act gct gga caa gag gac tat      192
Lys Pro Ile Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln Glu Asp Tyr
          50          55          60
gat cgt ctc aga ccc ttg tca tat ccg caa act gat gtc ttt ctt ata      240
Asp Arg Leu Arg Pro Leu Ser Tyr Pro Gln Thr Asp Val Phe Leu Ile
65          70          75          80
tgt ttt tcc ttg atc agt cct aca agt ttc gag aat gtt cga gca aag      288
Cys Phe Ser Leu Ile Ser Pro Thr Ser Phe Glu Asn Val Arg Ala Lys
          85          90          95
tgg ttt cct gaa gtg agc cat cat tgc cct cat acc cct atc atc tta      336
Trp Phe Pro Glu Val Ser His His Cys Pro His Thr Pro Ile Ile Leu
          100          105          110
gtg ggt acc aag ctt gat ctg cgt gaa gac aag gag aca att gag aaa      384
Val Gly Thr Lys Leu Asp Leu Arg Glu Asp Lys Glu Thr Ile Glu Lys
          115          120          125
ctg aga gac aag aag ctg tcc cct atc acc tac cct caa ggg ctg gcc      432
Leu Arg Asp Lys Lys Leu Ser Pro Ile Thr Tyr Pro Gln Gly Leu Ala
          130          135          140
atg gca agg gag ata agt gct gtg aag tat ctt gag tgc tca gcc tta      480
Met Ala Arg Glu Ile Ser Ala Val Lys Tyr Leu Glu Cys Ser Ala Leu
145          150          155          160
acc caa aaa ggg ctg aag aat gtc ttt gat gag gct att cgg gct gtt      528
Thr Gln Lys Gly Leu Lys Asn Val Phe Asp Glu Ala Ile Arg Ala Val
          165          170          175
ttg tgc cct aag cct aag cca aag aag aag aaa gga tgc gaa att ttg      576
Leu Cys Pro Lys Pro Lys Pro Lys Lys Lys Gly Cys Glu Ile Leu
          180          185          190
tga

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<210> 220

<211> 192

<212> PRT

<213> *Aplysia californica*

<400> 220

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Met Gln Ala Ile Lys Cys Val Val Val Gly Asp Gly Ala Val Gly Lys
1          5          10          15
Thr Cys Leu Leu Ile Ser Tyr Thr Thr Asn Ala Phe Pro Gly Glu Tyr
          20          25          30
Ile Pro Thr Val Phe Asp Asn Tyr Ser Ala Asn Val Met Val Asp Gly
          35          40          45
Lys Pro Ile Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln Glu Asp Tyr
          50          55          60
Asp Arg Leu Arg Pro Leu Ser Tyr Pro Gln Thr Asp Val Phe Leu Ile
65          70          75          80
Cys Phe Ser Leu Ile Ser Pro Thr Ser Phe Glu Asn Val Arg Ala Lys
          85          90          95
Trp Phe Pro Glu Val Ser His His Cys Pro His Thr Pro Ile Ile Leu
          100          105          110
Val Gly Thr Lys Leu Asp Leu Arg Glu Asp Lys Glu Thr Ile Glu Lys
          115          120          125

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Leu Arg Asp Lys Lys Leu Ser Pro Ile Thr Tyr Pro Gln Gly Leu Ala
 130 135 140
 Met Ala Arg Glu Ile Ser Ala Val Lys Tyr Leu Glu Cys Ser Ala Leu
 145 150 155 160
 Thr Gln Lys Gly Leu Lys Asn Val Phe Asp Glu Ala Ile Arg Ala Val
 165 170 175
 Leu Cys Pro Lys Pro Lys Pro Lys Lys Lys Gly Cys Glu Ile Leu
 180 185 190

<210> 221
 <211> 558
 <212> DNA
 <213> Schistosoma japonicum

<220>
 <221> CDS
 <222> (1) .. (558)

<400> 221
 atg caa gcc atc aaa tgt gta gtt atc ggt gat ggt gct gta gga aaa 48
 Met Gln Ala Ile Lys Cys Val Val Ile Gly Asp Gly Ala Val Gly Lys
 1 5 10 15
 aca tgt ttg ctc att agc tac act aca aat gct ttt cct ggt gag tat 96
 Thr Cys Leu Ile Ser Tyr Thr Thr Asn Ala Phe Pro Gly Glu Tyr
 20 25 30
 gtc cca act gtc ttc gat aac tac tct gcc aat gta atg gtt ggt gaa 144
 Val Pro Thr Val Phe Asp Asn Tyr Ser Ala Asn Val Met Val Gly Glu
 35 40 45
 aaa cgt gtg aac ctt ggt ttg tgg gat aca gct ggt caa gaa gat tat 192
 Lys Arg Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln Glu Asp Tyr
 50 55 60
 gat aga tta cgg cca cta tcg tat cca cag act gac gtt ttc ttg gtt 240
 Asp Arg Leu Arg Pro Leu Ser Tyr Pro Gln Thr Asp Val Phe Leu Val
 65 70 75 80
 tgc ttt tct ttg atc agt cct tca tca ttt gat aac gtt cgt gct aaa 288
 Cys Phe Ser Leu Ile Ser Pro Ser Ser Phe Asp Asn Val Arg Ala Lys
 85 90 95
 tgg tat cca gaa ata cgc cac ttt tct cca aac aca ccc att att ctt 336
 Trp Tyr Pro Glu Ile Arg His Phe Ser Pro Asn Thr Pro Ile Ile Leu
 100 105 110
 gtt gga aca aaa ctg gat ctc cgc aac agt tct acc agt cct aaa aac 384
 Val Gly Thr Lys Leu Asp Leu Arg Asn Ser Ser Thr Ser Pro Lys Asn
 115 120 125
 aac caa cca tca ata tct tat gaa caa ggt tta att atg gca aga gag 432
 Asn Gln Pro Ser Ile Ser Tyr Glu Gln Gly Leu Ile Met Ala Arg Glu
 130 135 140
 att gga gct cat aag tat cta gaa tgt tca gcg tta act cag gat gga 480
 Ile Gly Ala His Lys Tyr Leu Glu Cys Ser Ala Leu Thr Gln Asp Gly
 145 150 155 160
 tta aca gga tgt ttt cga tgc agc tat ccg ggc agt act cat gcc tcc 528
 Leu Thr Gly Cys Phe Arg Cys Ser Tyr Pro Gly Ser Thr His Ala Ser
 165 170 175
 agc tcg gaa aaa aaa aca tac ctt atg tga 558
 Ser Ser Glu Lys Lys Thr Tyr Leu Met
 180 185

<210> 222
 <211> 185
 <212> PRT
 <213> Schistosoma japonicum

<400> 222
 Met Gln Ala Ile Lys Cys Val Val Ile Gly Asp Gly Ala Val Gly Lys
 1 5 10 15
 Thr Cys Leu Leu Ile Ser Tyr Thr Thr Asn Ala Phe Pro Gly Glu Tyr
 20 25 30
 Val Pro Thr Val Phe Asp Asn Tyr Ser Ala Asn Val Met Val Gly Glu

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35 40 45
 Lys Arg Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln Glu Asp Tyr
 50 55 60
 Asp Arg Leu Arg Pro Leu Ser Tyr Pro Gln Thr Asp Val Phe Leu Val
 65 70 75 80
 Cys Phe Ser Leu Ile Ser Pro Ser Ser Phe Asp Asn Val Arg Ala Lys
 85 90 95
 Trp Tyr Pro Glu Ile Arg His Phe Ser Pro Asn Thr Pro Ile Ile Leu
 100 105 110
 Val Gly Thr Lys Leu Asp Leu Arg Asn Ser Ser Thr Ser Pro Lys Asn
 115 120 125
 Asn Gln Pro Ser Ile Ser Tyr Glu Gln Gly Leu Ile Met Ala Arg Glu
 130 135 140
 Ile Gly Ala His Lys Tyr Leu Glu Cys Ser Ala Leu Thr Gln Asp Gly
 145 150 155 160
 Leu Thr Gly Cys Phe Arg Cys Ser Tyr Pro Gly Ser Thr His Ala Ser
 165 170 175
 Ser Ser Glu Lys Lys Thr Tyr Leu Met
 180 185

<210> 223

<211> 576

<212> DNA

<213> Blumeria graminis

<220>

<221> CDS

<222> (1)..(576)

<400> 223

atg tct ctt aga tgc gtt gtt gtt ggc gat ggt gcc gtt gga aaa act 48
 Met Ser Leu Arg Cys Val Val Val Gly Asp Gly Ala Val Gly Lys Thr
 1 5 10 15
 tgt ctt ctc atc agc tat aca aca aat aaa ttc ccc tcc gaa tat gtc 96
 Cys Leu Leu Ile Ser Tyr Thr Thr Asn Lys Phe Pro Ser Glu Tyr Val
 20 25 30
 cct act gtc ttc gat aat tat gct gtt act gtt atg att ggc gat gag 144
 Pro Thr Val Phe Asp Asn Tyr Ala Val Thr Val Met Ile Gly Asp Glu
 35 40 45
 cca tat acc ctt ggc cta ttc gac act gct ggt caa gaa gat tac gat 192
 Pro Tyr Thr Leu Gly Leu Phe Asp Thr Ala Gly Gln Glu Asp Tyr Asp
 50 55 60
 cgc tta cgg ccc ctt tca tac cct caa act gat gta ttt ctc gtc tgt 240
 Arg Leu Arg Pro Leu Ser Tyr Pro Gln Thr Asp Val Phe Leu Val Cys
 65 70 75 80
 ttc tct gtt act tca ccc gca tca ttt gaa aat gtt cgc gag aaa tgg 288
 Phe Ser Val Thr Ser Pro Ala Ser Phe Glu Asn Val Arg Glu Lys Trp
 85 90 95
 ttt cct gaa gtc cat cat cac tgc cct gga gtc cct tgc tta att gtt 336
 Phe Pro Glu Val His His His Cys Pro Gly Val Pro Cys Leu Ile Val
 100 105 110
 ggc acc caa aca gat ctg aga gat gat ctt agc gtt cga gaa aag tta 384
 Gly Thr Gln Thr Asp Leu Arg Asp Asp Leu Ser Val Arg Glu Lys Leu
 115 120 125
 aac aaa cag aaa atg caa cca gtt aag aga gaa gat gga gag aga atg 432
 Asn Lys Gln Lys Met Gln Pro Val Lys Arg Glu Asp Gly Glu Arg Met
 130 135 140
 gct aag gat ttg ggt gca gtt aga tat gtg gaa tgc agc gcg ttg aca 480
 Ala Lys Asp Leu Gly Ala Val Arg Tyr Val Glu Cys Ser Ala Leu Thr
 145 150 155 160
 cag tat aag ttg aag gat gta ttc gat gag gct ata gtg gct gca cta 528
 Gln Tyr Lys Leu Lys Asp Val Phe Asp Glu Ala Ile Val Ala Ala Leu
 165 170 175
 gaa cct ccc gct cca aaa aag aag cat cga aac tgt cta atc cta 573
 Glu Pro Pro Ala Pro Lys Lys Lys Arg Asn Cys Leu Ile Leu
 180 185 190
 tga 576

<210> 224
 <211> 191
 <212> PRT
 <213> *Blumeria graminis*

<400> 224
 Met Ser Leu Arg Cys Val Val Val Gly Asp Gly Ala Val Gly Lys Thr
 1 5 10 15
 Cys Leu Leu Ile Ser Tyr Thr Thr Asn Lys Phe Pro Ser Glu Tyr Val
 20 25 30
 Pro Thr Val Phe Asp Asn Tyr Ala Val Thr Val Met Ile Gly Asp Glu
 35 40 45
 Pro Tyr Thr Leu Gly Leu Phe Asp Thr Ala Gly Gln Glu Asp Tyr Asp
 50 55 60
 Arg Leu Arg Pro Leu Ser Tyr Pro Gln Thr Asp Val Phe Leu Val Cys
 65 70 75 80
 Phe Ser Val Thr Ser Pro Ala Ser Phe Glu Asn Val Arg Glu Lys Trp
 85 90 95
 Phe Pro Glu Val His His His Cys Pro Gly Val Pro Cys Leu Ile Val
 100 105 110
 Gly Thr Gln Thr Asp Leu Arg Asp Asp Leu Ser Val Arg Glu Lys Leu
 115 120 125
 Asn Lys Gln Lys Met Gln Pro Val Lys Arg Glu Asp Gly Glu Arg Met
 130 135 140
 Ala Lys Asp Leu Gly Ala Val Arg Tyr Val Glu Cys Ser Ala Leu Thr
 145 150 155 160
 Gln Tyr Lys Leu Lys Asp Val Phe Asp Glu Ala Ile Val Ala Ala Leu
 165 170 175
 Glu Pro Pro Ala Pro Lys Lys Lys His Arg Asn Cys Leu Ile Leu
 180 185 190

<210> 225
 <211> 757
 <212> DNA
 <213> *Brassica napus*

<220>
 <221> CDS
 <222> (164)..(757)

<400> 225
 cgatacacccg attcatttca ttcttcattg atcgcttctc ctcacatacc cgatttcggt 60
 taggggttaac attttctagg gtttttagaga taggcgaac tgaaattgag aagaagacgg 120
 gtggttgtttc ctcatagatc tgagggggttg aatttttcga ttt atg agc gca tct 175
 Met Ser Ala Ser
 1
 cgg ttc ata aag tgc gtg acg gtt ggg gac gga gca gtg ggc aaa aca 223
 Arg Phe Ile Lys Cys Val Thr Val Gly Asp Gly Ala Val Gly Lys Thr
 5 10 15 20
 tgt ctc ctc atc tct tac acc agc aac act ttc cct acg gat tat gtt 271
 Cys Leu Leu Ile Ser Tyr Thr Ser Asn Thr Phe Pro Thr Asp Tyr Val
 25 30 35
 cca act gtt ttc gat aac ttc agc gct aat gtt gtt gtt aac gga gcc 319
 Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val Val Val Asn Gly Ala
 40 45 50
 act gtc aac tta gga ctc tgg gat acc gca ggg cag gag gat tat aac 367
 Thr Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln Glu Asp Tyr Asn
 55 60 65
 aga ttg aga ccc ttg agt tac cgc ggt gct gac gtt ttc atc ttg gcc 415
 Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp Val Phe Ile Leu Ala
 70 75 80

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ttc tct ctc atc agt aag gct agt tat gag aat gtc tcc aag aag tgg      463
Phe Ser Leu Ile Ser Lys Ala Ser Tyr Glu Asn Val Ser Lys Lys Trp
85          90          95          100
atc cct gag ctg acc cac tat gcc cct ggt gtc cct atc gtt ctt gtt      511
Ile Pro Glu Leu Thr His Tyr Ala Pro Gly Val Pro Ile Val Leu Val
          105          110          115
ggt acc aaa cta gat ctt agg gat gac aaa cag ttc ttc gtt gac cac      559
Gly Thr Lys Leu Asp Leu Arg Asp Asp Lys Gln Phe Phe Val Asp His
          120          125          130
cct ggt gct gta cct att acc act tct cag gga gag gaa cta atg aag      607
Pro Gly Ala Val Pro Ile Thr Thr Ser Gln Gly Glu Glu Leu Met Lys
          135          140          145
cta att gga gct cct tcg tac atc gag tgc agt tca aaa tct caa gag      655
Leu Ile Gly Ala Pro Ser Tyr Ile Glu Cys Ser Ser Lys Ser Gln Glu
          150          155          160
aac gtg aaa ggg gtg ttt gat gca gcg atc aga gtg gta ctt caa cct      703
Asn Val Lys Gly Val Phe Asp Ala Ala Ile Arg Val Val Leu Gln Pro
165          170          175          180
cca aag cag aag aaa aag aag agc aag gca caa aag gcc tgc tcc att      751
Pro Lys Gln Lys Lys Lys Ser Lys Ala Gln Lys Ala Cys Ser Ile
          185          190          195
ttg taa
Leu

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<210> 226

<211> 197

<212> PRT

<213> Brassica napus

<400> 226

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Met Ser Ala Ser Arg Phe Ile Lys Cys Val Thr Val Gly Asp Gly Ala
1          5          10          15
Val Gly Lys Thr Cys Leu Leu Ile Ser Tyr Thr Ser Asn Thr Phe Pro
          20          25          30
Thr Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val Val
          35          40          45
Val Asn Gly Ala Thr Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln
          50          55          60
Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp Val
65          70          75          80
Phe Ile Leu Ala Phe Ser Leu Ile Ser Lys Ala Ser Tyr Glu Asn Val
          85          90          95
Ser Lys Lys Trp Ile Pro Glu Leu Thr His Tyr Ala Pro Gly Val Pro
          100          105          110
Ile Val Leu Val Gly Thr Lys Leu Asp Leu Arg Asp Asp Lys Gln Phe
          115          120          125
Phe Val Asp His Pro Gly Ala Val Pro Ile Thr Thr Ser Gln Gly Glu
          130          135          140
Glu Leu Met Lys Leu Ile Gly Ala Pro Ser Tyr Ile Glu Cys Ser Ser
145          150          155          160
Lys Ser Gln Glu Asn Val Lys Gly Val Phe Asp Ala Ala Ile Arg Val
          165          170          175
Val Leu Gln Pro Pro Lys Gln Lys Lys Lys Ser Lys Ala Gln Lys
          180          185          190
Ala Cys Ser Ile Leu
          195

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<210> 227

<211> 1015

<212> DNA

<213> Zinnia elegans

<220>

<221> CDS

<222> (170)..(763)

<210> 228

<211> 197

<212> PRT

<213> Zinnia elegans

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<400> 228
 Met Ser Ala Ser Arg Phe Ile Lys Cys Val Thr Val Gly Asp Gly Ala
 1 5 10 15
 Val Gly Lys Thr Cys Leu Leu Ile Ser Tyr Thr Ser Asn Thr Phe Pro
 20 25 30
 Thr Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val Val
 35 40 45
 Val Asn Gly Ser Thr Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln
 50 55 60
 Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp Val
 65 70 75 80
 Phe Ile Leu Ala Phe Ser Leu Ile Ser Lys Ala Ser Tyr Glu Asn Val
 85 90 95
 Ser Lys Lys Trp Ile Pro Glu Leu Lys His Tyr Ala Pro Gly Val Pro
 100 105 110
 Ile Val Leu Val Gly Thr Lys Leu Asp Leu Arg Asp Asp Lys Gln Phe
 115 120 125
 Phe Val Asp His Pro Gly Ala Thr Pro Ile Thr Thr Ala Gln Gly Glu
 130 135 140
 Glu Leu Lys Lys Thr Ile Gly Ala Pro Glu Tyr Ile Glu Cys Ser Ser
 145 150 155 160
 Lys Thr Gln Leu Asn Val Lys Gln Val Phe Asp Ala Ala Ile Lys Val
 165 170 175
 Val Leu Ala Pro Lys Ala Lys Lys Lys Gly Lys Ala Gln Lys
 180 185 190
 Ala Cys Ser Ile Leu
 195

<210> 229

<211> 843

<212> DNA

<213> *Zinnia elegans*

<220>

<221> CDS

<222> (114)..(710)

<400> 229
 aaacacttgt cccattacta ctacacttat tccttttatc ttcctttccc ttgcttaaca 60

 acaacaacca aaccacttgt cgatctcttt gtatcatatt ccgatcgacc gaa atg 116
 Met
 1
 gca gca gca gcc acc aga ttc atc aag tgc gtc acc gtt ggc gac ggt 164
 Ala Ala Ala Ala Thr Arg Phe Ile Lys Cys Val Thr Val Gly Asp Gly
 5 10 15
 gcg gtc gga aaa acc tgc atg ctc atc tcc tac acc agc aat act ttc 212
 Ala Val Gly Lys Thr Cys Met Leu Ile Ser Tyr Thr Ser Asn Thr Phe
 20 25 30
 ccc acc gat tat gtg ccg aca gtg ttt gat aac ttc agt gcg aat gtt 260
 Pro Thr Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val
 35 40 45
 gtg gtc gga gac agc act gtc aat ctt ggc ctt tgg gat act gcc ggt 308
 Val Val Gly Asp Ser Thr Val Asn Leu Gly Leu Trp Asp Thr Ala Gly
 50 55 60 65
 cag gag gat tat aac aga ctg agg cca ctg agt tat aga ggt gca gat 356
 Gln Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp
 70 75 80
 gtg ttt tta ttg gca ttt tct ctc att agc aga ccc agt tat gaa aac 404
 Val Phe Leu Leu Ala Phe Ser Leu Ile Ser Arg Pro Ser Tyr Glu Asn
 85 90 95
 atc tcc aag aag tgg atc tca gaa cta agg cat tat gcc cca gat gtc 452
 Ile Ser Lys Lys Trp Ile Ser Glu Leu Arg His Tyr Ala Pro Asp Val
 100 105 110
 ccc att gtg ctg gtg gga acc aaa tta gat tta cgt gaa gac aaa caa 500
 Pro Ile Val Leu Val Gly Thr Lys Leu Asp Leu Arg Glu Asp Lys Gln
 115 120 125

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tat ttg agt gat cat cca aat gtt aca gcc atc aca act tct cag ggt 548
 Tyr Leu Ser Asp His Pro Asn Val Thr Ala Ile Thr Thr Ser Gln Gly
 130 135 140 145
 gaa gaa ctg aag aaa agt att ggt gca gca gtg tac att gag tgt agc 596
 Glu Glu Leu Lys Lys Ser Ile Gly Ala Ala Val Tyr Ile Glu Cys Ser
 150 155 160
 tcc aaa act caa cag aat gtg aag gct gtt ttt gat gct gcg att aga 644
 Ser Lys Thr Gln Gln Asn Val Lys Ala Val Phe Asp Ala Ala Ile Arg
 165 170 175
 gtt gtt tta caa cca cca aag ctg aag aaa aag cga agc aag caa cga 692
 Val Val Leu Gln Pro Pro Lys Leu Lys Lys Lys Arg Ser Lys Gln Arg
 180 185 190
 cta tgt gtc tat cta tagatctgct tctctgtgca attgcatgta taatgttcta 747
 Leu Cys Val Tyr Leu
 195
 tgtataatgt cttttctcatt tagaacttta aatgatgtaa tgaaatccaa gtcacaaat 807
 843
 ggtttccttg taaaaaaaaa aaaaaaaaaa aaaaaa

<210> 230

<211> 198

<212> PRT

<213> *Zinnia elegans*

<400> 230

Met Ala Ala Ala Ala Thr Arg Phe Ile Lys Cys Val Thr Val Gly Asp
 1 5 10 15
 Gly Ala Val Gly Lys Thr Cys Met Leu Ile Ser Tyr Thr Ser Asn Thr
 20 25 30
 Phe Pro Thr Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn
 35 40 45
 Val Val Val Gly Asp Ser Thr Val Asn Leu Gly Leu Trp Asp Thr Ala
 50 55 60
 Gly Gln Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala
 65 70 75 80
 Asp Val Phe Leu Leu Ala Phe Ser Leu Ile Ser Arg Pro Ser Tyr Glu
 85 90 95
 Asn Ile Ser Lys Lys Trp Ile Ser Glu Leu Arg His Tyr Ala Pro Asp
 100 105 110
 Val Pro Ile Val Leu Val Gly Thr Lys Leu Asp Leu Arg Glu Asp Lys
 115 120 125
 Gln Tyr Leu Ser Asp His Pro Asn Val Thr Ala Ile Thr Thr Ser Gln
 130 135 140
 Gly Glu Glu Leu Lys Lys Ser Ile Gly Ala Ala Val Tyr Ile Glu Cys
 145 150 155 160
 Ser Ser Lys Thr Gln Gln Asn Val Lys Ala Val Phe Asp Ala Ala Ile
 165 170 175
 Arg Val Val Leu Gln Pro Pro Lys Leu Lys Lys Lys Arg Ser Lys Gln
 180 185 190
 Arg Leu Cys Val Tyr Leu
 195

<210> 231

<211> 659

<212> DNA

<213> *Ciona intestinalis*

<220>

<221> CDS

<222> (24)..(605)

<400> 231

ataaaaattta ttgaaacacg aag atg nct tca att cgt aag aag ctg aaa ata 53
 Met Xaa Ser Ile Arg Lys Lys Leu Lys Ile

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	1	5	10	
gat ggc gaa ggg gct tgt ggt aaa act tgc tta ctc atc gng ttt agc				101
Asp Gly Glu Gly Ala Cys Gly Lys Thr Cys Leu Leu Ile Xaa Phe Ser				
aaa gat caa ttc cca gaa gtt tac gtc cca act gtt ttt gaa aac tat	15	20	25	149
Lys Asp Gln Phe Pro Glu Val Tyr Val Pro Thr Val Phe Glu Asn Tyr				
gtg gct gat att gaa gta gac tct aaa cag gtt gag ctt gct ttg tgg	30	35	40	197
Val Ala Asp Ile Glu Val Asp Ser Lys Gln Val Glu Leu Ala Leu Trp				
gat aca gct ggt caa gaa gat tac gac agg ctt cgt cca ctt tcc tac	45	50	55	245
Asp Thr Ala Gly Gln Glu Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr				
ccc gat act gat gtt att ctt atg tgt ttc tca atc gac agt cca gat	60	65	70	293
Pro Asp Thr Asp Val Ile Leu Met Cys Phe Ser Ile Asp Ser Pro Asp				
tca ctt gag aac att ccc gaa aaa tgg acc cct gag gta agg cat ttt	75	80	85	341
Ser Leu Glu Asn Ile Pro Glu Lys Trp Thr Pro Glu Val Arg His Phe				
tgc cca agt gtt cca aty att ttg gtt gga aac aaa aaa gat ctt cgt	95	100	105	389
Cys Pro Ser Val Pro Ile Ile Leu Val Gly Asn Lys Lys Asp Leu Arg				
aac ggc agt tca aca ata aaa gaa ctt gct aaa atg aaa caa tct gcc	110	115	120	437
Asn Gly Ser Ser Thr Ile Lys Glu Leu Ala Lys Met Lys Gln Ser Ala				
gtt agt aac gaa gat gga atg gcg atg gca gac aag att ggc gct tac	125	130	135	485
Val Ser Asn Glu Asp Gly Met Ala Met Ala Asp Lys Ile Gly Ala Tyr				
gga tat atg gaa tgt tca gcg cgc acc aaa gaa ggt gtt cgg gaa gtg	140	145	150	533
Gly Tyr Met Glu Cys Ser Ala Arg Thr Lys Glu Gly Val Arg Glu Val				
ttt gag ctt gca act aaa gca gct tta caa acc aag aaa aga aag aaa	155	160	165	581
Phe Glu Leu Ala Thr Lys Ala Ala Leu Gln Thr Lys Lys Arg Lys Lys				
aag agt gga tct gaa gtc ttg taaagaaatt ttaactggag tctagcaatt	175	180	185	632
Lys Ser Gly Ser Glu Val Leu				
gacttaacat tggacgcatg ctttcat	190			659

<210> 232

<211> 193

<212> PRT

<213> Ciona intestinalis

<400> 232

Met Xaa Ser Ile Arg Lys Lys Leu Lys Ile Asp Gly Glu Gly Ala Cys	1	5	10	15
Gly Lys Thr Cys Leu Leu Ile Xaa Phe Ser Lys Asp Gln Phe Pro Glu				
Val Tyr Val Pro Thr Val Phe Glu Asn Tyr Val Ala Asp Ile Glu Val	20	25	30	
Asp Ser Lys Gln Val Glu Leu Ala Leu Trp Asp Thr Ala Gly Gln Glu	35	40	45	
Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Asp Thr Asp Val Ile	50	55	60	
Leu Met Cys Phe Ser Ile Asp Ser Pro Asp Ser Leu Glu Asn Ile Pro	65	70	75	80
Glu Lys Trp Thr Pro Glu Val Arg His Phe Cys Pro Ser Val Pro Ile	85	90	95	
Ile Leu Val Gly Asn Lys Lys Asp Leu Arg Asn Gly Ser Ser Thr Ile	100	105	110	
Lys Glu Leu Ala Lys Met Lys Gln Ser Ala Val Ser Asn Glu Asp Gly	115	120	125	
Met Ala Met Ala Asp Lys Ile Gly Ala Tyr Gly Tyr Met Glu Cys Ser	130	135	140	
	145	150	155	160

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Ala	Arg	Thr	Lys	Glu	Gly	Val	Arg	Glu	Val	Phe	Glu	Leu	Ala	Thr	Lys
			165					170						175	
Ala	Ala	Leu	Gln	Thr	Lys	Lys	Arg	Lys	Lys	Lys	Ser	Gly	Ser	Glu	Val
			180					185					190		
Leu															

<210> 233
 <211> 567
 <212> DNA
 <213> Schistosoma mansoni

<220>
 <221> CDS
 <222> (1) .. (567)

<400> 233

atg	caa	gcc	atc	aaa	tgt	gtg	gtt	gtc	ggg	gat	ggc	gct	gtc	gga	aag	48
Met	Gln	Ala	Ile	Lys	Cys	Val	Val	Val	Gly	Asp	Gly	Ala	Val	Gly	Lys	
1			5					10					15			
acc	tgt	tta	ctc	att	agc	tac	acg	acg	aat	gcc	ttt	cct	ggg	gag	tac	96
Thr	Cys	Leu	Leu	Ile	Ser	Tyr	Thr	Thr	Asn	Ala	Phe	Pro	Gly	Glu	Tyr	
			20					25				30				
gtc	cca	acc	gtt	ttc	gat	aac	tat	tct	gcc	aac	gta	atg	gtt	gac	cga	144
Val	Pro	Thr	Val	Phe	Asp	Asn	Tyr	Ser	Ala	Asn	Val	Met	Val	Asp	Arg	
			35				40				45					
aaa	cct	gtg	aac	ctt	ggg	ttg	tgg	gat	aca	gct	ggg	cag	gag	gat	tat	192
Lys	Pro	Val	Asn	Leu	Gly	Leu	Trp	Asp	Thr	Ala	Gly	Gln	Glu	Asp	Tyr	
	50				55						60					
gac	aga	cta	aga	cca	ctc	tca	tat	cca	caa	act	gat	gtg	ttt	ttg	gtg	240
Asp	Arg	Leu	Arg	Pro	Leu	Ser	Tyr	Pro	Gln	Thr	Asp	Val	Phe	Leu	Val	
	65				70					75				80		
tgc	ttc	tcc	tta	gtc	agt	cgc	aca	tcg	ttc	gag	aat	gtt	cgt	agt	aaa	288
Cys	Phe	Ser	Leu	Val	Ser	Arg	Thr	Ser	Phe	Glu	Asn	Val	Arg	Ser	Lys	
			85					90				95				
tgg	cat	ccg	gag	ata	tcc	gca	tat	gtt	cca	aga	gct	cct	att	att	ctt	336
Trp	His	Pro	Glu	Ile	Ser	Ala	Tyr	Val	Pro	Arg	Ala	Pro	Ile	Ile	Leu	
			100					105				110				
gtc	gga	act	aaa	cga	gac	ctt	cgg	gat	agt	cct	aat	ggc	cta	aaa	tca	384
Val	Gly	Thr	Lys	Arg	Asp	Leu	Arg	Asp	Ser	Pro	Asn	Gly	Leu	Lys	Ser	
			115				120					125				
aca	acg	ttt	cca	gtc	acg	tat	gca	gag	ggg	tgc	agg	atg	gcc	aga	gaa	432
Thr	Thr	Phe	Pro	Val	Thr	Tyr	Ala	Glu	Gly	Cys	Arg	Met	Ala	Arg	Glu	
			130			135					140					
att	aaa	gct	gtg	aaa	tac	ctg	gaa	tgc	tct	gct	cta	act	cag	ttt	gga	480
Ile	Lys	Ala	Val	Lys	Tyr	Leu	Glu	Cys	Ser	Ala	Leu	Thr	Gln	Phe	Gly	
			145		150					155				160		
tta	aaa	gat	gtc	ttc	gac	gaa	gct	att	cga	gca	gta	ctg	atg	cct	gaa	528
Leu	Lys	Asp	Val	Phe	Asp	Glu	Ala	Ile	Arg	Ala	Val	Leu	Met	Pro	Glu	
			165					170				175				
ggg	aag	aaa	aag	aaa	cat	agt	tca	tgt	gaa	tta	att	taa				567
Gly	Lys	Lys	Lys	Lys	His	Ser	Ser	Cys	Glu	Leu	Ile					
			180					185								

<210> 234
 <211> 188
 <212> PRT
 <213> Schistosoma mansoni

<400> 234

Met	Gln	Ala	Ile	Lys	Cys	Val	Val	Val	Gly	Asp	Gly	Ala	Val	Gly	Lys
1			5						10				15		
Thr	Cys	Leu	Leu	Ile	Ser	Tyr	Thr	Thr	Asn	Ala	Phe	Pro	Gly	Glu	Tyr
			20					25				30			
Val	Pro	Thr	Val	Phe	Asp	Asn	Tyr	Ser	Ala	Asn	Val	Met	Val	Asp	Arg
			35				40				45				
Lys	Pro	Val	Asn	Leu	Gly	Leu	Trp	Asp	Thr	Ala	Gly	Gln	Glu	Asp	Tyr

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50 55 60
 Asp Arg Leu Arg Pro Leu Ser Tyr Pro Gln Thr Asp Val Phe Leu Val
 65 70 75 80
 Cys Phe Ser Leu Val Ser Arg Thr Ser Phe Glu Asn Val Arg Ser Lys
 85 90 95
 Trp His Pro Glu Ile Ser Ala Tyr Val Pro Arg Ala Pro Ile Ile Leu
 100 105 110
 Val Gly Thr Lys Arg Asp Leu Arg Asp Ser Pro Asn Gly Leu Lys Ser
 115 120 125
 Thr Thr Phe Pro Val Thr Tyr Ala Glu Gly Cys Arg Met Ala Arg Glu
 130 135 140
 Ile Lys Ala Val Lys Tyr Leu Glu Cys Ser Ala Leu Thr Gln Phe Gly
 145 150 155 160
 Leu Lys Asp Val Phe Asp Glu Ala Ile Arg Ala Val Leu Met Pro Glu
 165 170 175
 Gly Lys Lys Lys Lys His Ser Ser Cys Glu Leu Ile
 180 185

<210> 235

<211> 600

<212> DNA

<213> *Penicillium marneffei*

<220>

<221> CDS

<222> (1)..(600)

<400> 235

atg gcg tct ggg cct gcg act caa tcg ttg aag tgt gtg gtg acc ggt	48
Met Ala Ser Gly Pro Ala Thr Gln Ser Leu Lys Cys Val Val Thr Gly	
1 5 10 15	
gat ggt gct gtc ggc aag aca tgt ctc ctg ata tca tac acc acc aat	96
Asp Gly Ala Val Gly Lys Thr Cys Leu Leu Ile Ser Tyr Thr Thr Asn	
20 25 30	
gcc ttt ccc ggc gaa tac att ccc acc gta ttc gac aac tac tcc gct	144
Ala Phe Pro Gly Glu Tyr Ile Pro Thr Val Phe Asp Asn Tyr Ser Ala	
35 40 45	
agt gtc atg gtc gac ggc agg ccc atc agc ctc gga ctc tgg gat aca	192
Ser Val Met Val Asp Gly Arg Pro Ile Ser Leu Gly Leu Trp Asp Thr	
50 55 60	
gct ggt caa gag gat tat gac cgt ctc cgc ccc tta tcc tac cct caa	240
Ala Gly Gln Glu Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Gln	
65 70 75 80	
acc gac gtc ttc ttg atc tgc ttc tct atc gtc tct cca cca tcc ttt	288
Thr Asp Val Phe Leu Ile Cys Phe Ser Ile Val Ser Pro Pro Ser Phe	
85 90 95	
gac aac gta aaa gcc aag tgg ttt ccc gaa atc gag cac cat gca ccc	336
Asp Asn Val Lys Ala Lys Trp Phe Pro Glu Ile Glu His His Ala Pro	
100 105 110	
ggc gtg ccc atc att ctt gtc ggc aca aag ctt gat ttg aga gaa gat	384
Gly Val Pro Ile Ile Leu Val Gly Thr Lys Leu Asp Leu Arg Glu Asp	
115 120 125	
aga gct acc gct gag gcg ctg cga gcc aaa aag atg gag ccg gtg tcg	432
Arg Ala Thr Ala Glu Ala Leu Arg Ala Lys Lys Met Glu Pro Val Ser	
130 135 140	
tat gag cag gcg ctt gca gtt gca aag gag att agg gcg cat aag tat	480
Tyr Glu Gln Ala Leu Ala Val Ala Lys Glu Ile Arg Ala His Lys Tyr	
145 150 155 160	
ctg gag tgt tcg gcc ttg acc cag agg aat ttg aag agc gtg ttt gat	528
Leu Glu Cys Ser Ala Leu Thr Gln Arg Asn Leu Lys Ser Val Phe Asp	
165 170 175	
gaa gct att cgg gcc gtc ctc aat cct cgc cct caa ccc aag aac aag	576
Glu Ala Ile Arg Ala Val Leu Asn Pro Arg Pro Gln Pro Lys Asn Lys	
180 185 190	
gca aaa cga tgc act att ctg taa	600
Ala Lys Arg Cys Thr Ile Leu	
195	

<210> 236
 <211> 199
 <212> PRT
 <213> *Penicillium marneffei*

<400> 236
 Met Ala Ser Gly Pro Ala Thr Gln Ser Leu Lys Cys Val Val Thr Gly
 1 5 10 15
 Asp Gly Ala Val Gly Lys Thr Cys Leu Leu Ile Ser Tyr Thr Thr Asn
 20 25 30
 Ala Phe Pro Gly Glu Tyr Ile Pro Thr Val Phe Asp Asn Tyr Ser Ala
 35 40 45
 Ser Val Met Val Asp Gly Arg Pro Ile Ser Leu Gly Leu Trp Asp Thr
 50 55 60
 Ala Gly Gln Glu Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Gln
 65 70 75 80
 Thr Asp Val Phe Leu Ile Cys Phe Ser Ile Val Ser Pro Pro Ser Phe
 85 90 95
 Asp Asn Val Lys Ala Lys Trp Phe Pro Glu Ile Glu His His Ala Pro
 100 105 110
 Gly Val Pro Ile Ile Leu Val Gly Thr Lys Leu Asp Leu Arg Glu Asp
 115 120 125
 Arg Ala Thr Ala Glu Ala Leu Arg Ala Lys Lys Met Glu Pro Val Ser
 130 135 140
 Tyr Glu Gln Ala Leu Ala Val Ala Lys Glu Ile Arg Ala His Lys Tyr
 145 150 155 160
 Leu Glu Cys Ser Ala Leu Thr Gln Arg Asn Leu Lys Ser Val Phe Asp
 165 170 175
 Glu Ala Ile Arg Ala Val Leu Asn Pro Arg Pro Gln Pro Lys Asn Lys
 180 185 190
 Ala Lys Arg Cys Thr Ile Leu
 195

<210> 237
 <211> 845
 <212> DNA
 <213> *Schistosoma japonicum*

<220>
 <221> CDS
 <222> (39)..(617)

<400> 237
 ccgggcccc ccttggaactt tactgggtttg ctggagtg atg agt gca ata agg aaa 56
 Met Ser Ala Ile Arg Lys
 1 5
 aag ctc gtt att gtt ggg gat gga gcc tgt ggg aaa act tgt cta cta 104
 Lys Leu Val Ile Val Gly Asp Gly Ala Cys Gly Lys Thr Cys Leu Leu
 10 15 20
 ata gta ttt agc aaa gac cag ttt cct gaa gtt tac gtt ccg act gta 152
 Ile Val Phe Ser Lys Asp Gln Phe Pro Glu Val Tyr Val Pro Thr Val
 25 30 35
 ttc gaa aac tat gtc gcg gat att gag gta gat aac aaa cag gtt gaa 200
 Phe Glu Asn Tyr Val Ala Asp Ile Glu Val Asp Asn Lys Gln Val Glu
 40 45 50
 ttg gca ctt tgg gat act gct ggt caa gaa gac tat gac aga tta aga 248
 Leu Ala Leu Trp Asp Thr Ala Gly Gln Glu Asp Tyr Asp Arg Leu Arg
 55 60 65 70
 cca ctt tct tac ccc gat acg gat gtt att tta atg tgc ttt agc atc 296
 Pro Leu Ser Tyr Pro Asp Thr Asp Val Ile Leu Met Cys Phe Ser Ile
 75 80 85
 gac act cca gat agt ttg gaa aac ata cct gag aaa tgg aca cca gaa 344
 Asp Thr Pro Asp Ser Leu Glu Asn Ile Pro Glu Lys Trp Thr Pro Glu
 90 95 100
 gtc cga cat ttc tgc cct gat gta cct att gtc tta gtt gga aac aaa 392
 Val Arg His Phe Cys Pro Asp Val Pro Ile Val Leu Val Gly Asn Lys
 105 110 115

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aag gac ttg cga agt gaa aac tca aca aga gat gac gga cat aga gga 440
Lys Asp Leu Arg Ser Glu Asn Ser Thr Arg Asp Asp Gly His Arg Gly
120 125 130
aaa cag gaa ttt gtt aaa tcg gat gag ggt tat gca atg gcc gat cgt 488
Lys Gln Glu Phe Val Lys Ser Asp Glu Gly Tyr Ala Met Ala Asp Arg
135 140 145 150
att cat gct tac tca tat atc gag tgt tca gct aag acg aag gaa gga 536
Ile His Ala Tyr Ser Tyr Ile Glu Cys Ser Ala Lys Thr Lys Glu Gly
155 160 165
gtt cgt gaa gtt ttc gag acc gcg act aga gct gct tta cag tcg aag 584
Val Arg Glu Val Phe Glu Thr Ala Thr Arg Ala Ala Leu Gln Ser Lys
170 175 180
aaa acg aaa aag aag aag tgt gat cta att tgattctcgg ttttctccaa 634
Lys Thr Lys Lys Lys Lys Cys Asp Leu Ile
185 190
atatgggttat ccggttttaa agactttctta cattcccccc ttccgatttc gcttcaggat 694

attaaatttc gactttttat taactgcttg tttcttcaac aaacatattt tggtttttta 754

aaaagacaat ccattccatg ataaccttta ttatccggtt ttatcttgat actaaaatct 814

gtcaggcctg ttaaaaaaaaa aaaaaaaaaa a 845

<210> 238

<211> 192

<212> PRT

<213> Schistosoma japonicum

<400> 238

Met Ser Ala Ile Arg Lys Lys Leu Val Ile Val Gly Asp Gly Ala Cys
1 5 10 15
Gly Lys Thr Cys Leu Leu Ile Val Phe Ser Lys Asp Gln Phe Pro Glu
20 25 30
Val Tyr Val Pro Thr Val Phe Glu Asn Tyr Val Ala Asp Ile Glu Val
35 40 45
Asp Asn Lys Gln Val Glu Leu Ala Leu Trp Asp Thr Ala Gly Gln Glu
50 55 60
Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Asp Thr Asp Val Ile
65 70 75 80
Leu Met Cys Phe Ser Ile Asp Thr Pro Asp Ser Leu Glu Asn Ile Pro
85 90 95
Glu Lys Trp Thr Pro Glu Val Arg His Phe Cys Pro Asp Val Pro Ile
100 105 110
Val Leu Val Gly Asn Lys Lys Asp Leu Arg Ser Glu Asn Ser Thr Arg
115 120 125
Asp Asp Gly His Arg Gly Lys Gln Glu Phe Val Lys Ser Asp Glu Gly
130 135 140
Tyr Ala Met Ala Asp Arg Ile His Ala Tyr Ser Tyr Ile Glu Cys Ser
145 150 155 160
Ala Lys Thr Lys Glu Gly Val Arg Glu Val Phe Glu Thr Ala Thr Arg
165 170 175
Ala Ala Leu Gln Ser Lys Lys Thr Lys Lys Lys Lys Cys Asp Leu Ile
180 185 190

<210> 239

<211> 582

<212> DNA

<213> Ustilago maydis

<220>

<221> CDS

<222> (1)..(582)

<400> 239
 atg cag acc atc aag tgt gta gtc gtc gga gac ggt gcc gtc gga aag 48
 Met Gln Thr Ile Lys Cys Val Val Val Gly Asp Gly Ala Val Gly Lys
 1 5 10 15
 acg tgt ctt ctt atc tcg tat aca acc aac gcc ttc ccg ggc gaa tac 96
 Thr Cys Leu Leu Ile Ser Tyr Thr Asn Ala Phe Pro Gly Glu Tyr
 20 25 30
 atc ccc aca gtg ttt gac aac tat tcg gca aac gtc atg gtc gac ggt 144
 Ile Pro Thr Val Phe Asp Asn Tyr Ser Ala Asn Val Met Val Asp Gly
 35 40 45
 aaa ccc gtc tct ctc ggt ctc tgg gat act gcg ggt caa gaa gac tac 192
 Lys Pro Val Ser Leu Gly Leu Trp Asp Thr Ala Gly Gln Glu Asp Tyr
 50 55 60
 gac cgg tta aga ccg ctc tcg tac ccg caa acc gac gtg ttc ctc gtg 240
 Asp Arg Leu Arg Pro Leu Ser Tyr Pro Gln Thr Asp Val Phe Leu Val
 65 70 75 80
 tgc ttt tca-ctg gtg agt cca-cct tcg ttc gaa aac gtt cga acc aag 288
 Cys Phe Ser Leu Val Ser Pro Pro Ser Phe Glu Asn Val Arg Thr Lys
 85 90 95
 tgg tgg ccc gaa gtg tcg cat cac gct ccc aac att ccc acc atc ctc 336
 Trp Trp Pro Glu Val Ser His His Ala Pro Asn Ile Pro Thr Ile Leu
 100 105 110
 gtg gga acc aag ttg gat ctg cgc gag gat cca gaa acg att gcc aag 384
 Val Gly Thr Lys Leu Asp Leu Arg Glu Asp Pro Glu Thr Ile Ala Lys
 115 120 125
 ctg cgc gat cgc agg atg cag cct atc acg tat gcg cag ggc aat cag 432
 Leu Arg Asp Arg Arg Met Gln Pro Ile Thr Tyr Ala Gln Gly Asn Gln
 130 135 140
 atg gcg agg gac att cac gct acc aag tat ttg gag tgc tct gca ctc 480
 Met Ala Arg Asp Ile His Ala Thr Lys Tyr Leu Glu Cys Ser Ala Leu
 145 150 155 160
 acc cag aag gga ttg aag ggc gta ttt gat gaa gcg atc agg agc gtt 528
 Thr Gln Lys Gly Leu Lys Gly Val Phe Asp Glu Ala Ile Arg Ser Val
 165 170 175
 ttg gct cct gca cca gtc cag agt aag aag aaa aac aac tgt ttg att 576
 Leu Ala Pro Ala Pro Val Gln Ser Lys Lys Lys Asn Asn Cys Leu Ile
 180 185 190
 ctt taa 582
 Leu

<210> 240

<211> 193

<212> PRT

<213> Ustilago maydis

<400> 240

Met Gln Thr Ile Lys Cys Val Val Val Gly Asp Gly Ala Val Gly Lys
 1 5 10 15
 Thr Cys Leu Leu Ile Ser Tyr Thr Thr Asn Ala Phe Pro Gly Glu Tyr
 20 25 30
 Ile Pro Thr Val Phe Asp Asn Tyr Ser Ala Asn Val Met Val Asp Gly
 35 40 45
 Lys Pro Val Ser Leu Gly Leu Trp Asp Thr Ala Gly Gln Glu Asp Tyr
 50 55 60
 Asp Arg Leu Arg Pro Leu Ser Tyr Pro Gln Thr Asp Val Phe Leu Val
 65 70 75 80
 Cys Phe Ser Leu Val Ser Pro Pro Ser Phe Glu Asn Val Arg Thr Lys
 85 90 95
 Trp Trp Pro Glu Val Ser His His Ala Pro Asn Ile Pro Thr Ile Leu
 100 105 110
 Val Gly Thr Lys Leu Asp Leu Arg Glu Asp Pro Glu Thr Ile Ala Lys
 115 120 125
 Leu Arg Asp Arg Arg Met Gln Pro Ile Thr Tyr Ala Gln Gly Asn Gln
 130 135 140
 Met Ala Arg Asp Ile His Ala Thr Lys Tyr Leu Glu Cys Ser Ala Leu

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145 150 155 160
 Thr Gln Lys Gly Leu Lys Gly Val Phe Asp Glu Ala Ile Arg Ser Val
 165 170 175
 Leu Ala Pro Ala Pro Val Gln Ser Lys Lys Lys Asn Asn Cys Leu Ile
 180 185 190
 Leu

<210> 241
 <211> 1196
 <212> DNA
 <213> Ustilago maydis

<220>
 <221> CDS
 <222> (436)..(1080)

<400> 241
 aattgcgatg ggatgcaacc gtccacaggg tcccctaagc ccgtgggttc atgtggtcaa 60
 cctcgccacg gccttgatca acaccacca ccgcattcgt agattttcaa acaataccgg 120
 ccccatattca tcgccttttg gttttggaag tcaggaacaa gcagcatcat agcaagtgga 180
 cgcaccaacg agcccaagtt acagccaatg gacattcagc tttcctccgg ttcgctcgac 240
 ggccgaatcc tcctcctctc tgcgggaac gggcgacaaa ccattgtagg aattgacacc 300
 gattgtttca attgtcccag ccagaagttt gcaccgctca gcacctttgg cattggtagg 360
 aacagaaatc ccttttcgtt tccatcgcaa acaggaacac tgtcttggtg atcatctttg 420
 ctcccgcgc tcagc atg gca ccg gca gca att tgt agg aag ctt gta att 471
 Met Ala Pro Ala Ala Ile Cys Arg Lys Leu Val Ile
 1 5 10
 gtc ggc gac ggt gct tgc ggc aag acg agt ttg ctt tgc gtt ttt gcc 519
 Val Gly Asp Gly Ala Cys Gly Lys Thr Ser Leu Leu Cys Val Phe Ala
 15 20 25
 att ggc gag ttc ccg caa gag tat gaa ccc acc att ttc gaa aac tac 567
 Ile Gly Glu Phe Pro Gln Glu Tyr Glu Pro Thr Ile Phe Glu Asn Tyr
 30 35 40
 gtc gcc gag atc cgc ctt gat ggc aag cct gtc cag ctg gcg cta tgg 615
 Val Ala Glu Ile Arg Leu Asp Gly Lys Pro Val Gln Leu Ala Leu Trp
 45 50 55 60
 gac acc gcg ggt cag gaa gaa tac gag cgt ctt cgt cca ctc tcc tac 663
 Asp Thr Ala Gly Gln Glu Glu Tyr Glu Arg Leu Arg Pro Leu Ser Tyr
 65 70 75
 tca caa gca cac gtc atc ttg atc gcc ttt gcc atc gat aca ccc gac 711
 Ser Gln Ala His Val Ile Leu Ile Ala Phe Ala Ile Asp Thr Pro Asp
 80 85 90
 tcg ctc gaa aac gtg caa gtc aag tgg atg gag gag gta cgt caa ata 759
 Ser Leu Glu Asn Val Gln Val Lys Trp Met Glu Glu Val Arg Gln Ile
 95 100 105
 tgc ggc ccc tca gtg cct gtg ctc ctg gta ggc tgc aag aag gat ctt 807
 Cys Gly Pro Ser Val Pro Val Leu Leu Val Gly Cys Lys Lys Asp Leu
 110 115 120
 cgc gaa aat gcc atc gct aag ggc aag ccg gtt cag ggt cac tat gta 855
 Arg Glu Asn Ala Ile Ala Lys Gly Lys Pro Val Gln Gly His Tyr Val
 125 130 135 140
 aag aga caa cag gct aaa ctg gta gca gca cag atc ggc gct cga tcg 903
 Lys Arg Gln Gln Ala Lys Leu Val Ala Ala Gln Ile Gly Ala Arg Ser

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145 150 155
 tat cac gaa tgc tca tca ctc aac aac caa ggc gtc gac gcc gtg ttc 951
 Tyr His Glu Cys Ser Ser Leu Asn Asn Gln Gly Val Asp Ala Val Phe
 160 165 170
 gaa gcc gcg acg cgc gcg gcc atg ctt gtg cgc aat tcc ggt gct tct 999
 Glu Ala Ala Thr Arg Ala Ala Met Leu Val Arg Asn Ser Gly Ala Ser
 175 180 185
 tca gga gcc gcc atc tcg cag agc aag acc aag gag gca tta cac aac 1047
 Ser Gly Gly Ala Ile Ser Gln Ser Lys Thr Lys Glu Ala Leu His Asn
 190 195 200
 gat gct ggc tct tgc aaa tgt atc gtc ctc tagaaatctc tcttgtgctt 1097
 Asp Ala Gly Ser Cys Lys Cys Ile Val Leu
 205 210
 cgtcttgtcg acccttgtcc taagcctcgc tctcgtctgc ctttccatcg tacagtcgct 1157

 ctccctgcat ttttgtccct ccactcctcc catgttcta 1196

<210> 242
 <211> 214
 <212> PRT
 <213> Ustilago maydis

<400> 242
 Met Ala Pro Ala Ala Ile Cys Arg Lys Leu Val Ile Val Gly Asp Gly
 1 5 10 15
 Ala Cys Gly Lys Thr Ser Leu Leu Cys Val Phe Ala Ile Gly Glu Phe
 20 25 30
 Pro Gln Glu Tyr Glu Pro Thr Ile Phe Glu Asn Tyr Val Ala Glu Ile
 35 40 45
 Arg Leu Asp Gly Lys Pro Val Gln Leu Ala Leu Trp Asp Thr Ala Gly
 50 55 60
 Gln Glu Glu Tyr Glu Arg Leu Arg Pro Leu Ser Tyr Ser Gln Ala His
 65 70 75 80
 Val Ile Leu Ile Ala Phe Ala Ile Asp Thr Pro Asp Ser Leu Glu Asn
 85 90 95
 Val Gln Val Lys Trp Met Glu Glu Val Arg Gln Ile Cys Gly Pro Ser
 100 105 110
 Val Pro Val Leu Leu Val Gly Cys Lys Lys Asp Leu Arg Glu Asn Ala
 115 120 125
 Ile Ala Lys Gly Lys Pro Val Gln Gly His Tyr Val Lys Arg Gln Gln
 130 135 140
 Ala Lys Leu Val Ala Ala Gln Ile Gly Ala Arg Ser Tyr His Glu Cys
 145 150 155 160
 Ser Ser Leu Asn Asn Gln Gly Val Asp Ala Val Phe Glu Ala Ala Thr
 165 170 175
 Arg Ala Ala Met Leu Val Arg Asn Ser Gly Ala Ser Ser Gly Gly Ala
 180 185 190
 Ile Ser Gln Ser Lys Thr Lys Glu Ala Leu His Asn Asp Ala Gly Ser
 195 200 205
 Cys Lys Cys Ile Val Leu
 210

<210> 243
 <211> 576
 <212> DNA
 <213> Ustilago maydis

<220>
 <221> CDS
 <222> (1)..(576)

<400> 243
 atg cag acc atc aag tgt gtt gtt gtc gga gat ggt gcg gtc ggt aag 48
 Met Gln Thr Ile Lys Cys Val Val Val Gly Asp Gly Ala Val Gly Lys

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1	5	10	15	
acc tgc ctg ttg att tcg tac acc acc aac aag ttt ccc tcg gag tat				96
Thr Cys Leu Leu Ile Ser Tyr Thr Thr Asn Lys Phe Pro Ser Glu Tyr				
20	25	30		
ggt ccg aca gtg ttt gac aac tac gcc gtg act gtc atg att ggc gag				144
Val Pro Thr Val Phe Asp Asn Tyr Ala Val Thr Val Met Ile Gly Glu				
35	40	45		
gat ccg tac aca ctc gga ttg ttc gat acc gcc ggt cag gag gac tac				192
Asp Pro Tyr Thr Leu Gly Leu Phe Asp Thr Ala Gly Gln Glu Asp Tyr				
50	55	60		
gac cga ctg cga ccg ctt tca tac ccg cag acg gat gtc ttc ctg gtc				240
Asp Arg Leu Arg Pro Leu Ser Tyr Pro Gln Thr Asp Val Phe Leu Val				
65	70	75	80	
tgc ttc tcg gtc acc tca cca gcc tcg ttc gaa aat gtc aag gaa aag				288
Cys Phe Ser Val Thr Ser Pro Ala Ser Phe Glu Asn Val Lys Glu Lys				
85	90	95		
tgg ttc ccg gag gtg cat cac cat tgc cct ggt gtg ccg tgc ctg att				336
Trp Phe Pro Glu Val His His His Cys Pro Gly Val Pro Cys Leu Ile				
100	105	110		
gtg gga acc cag gtg gat ttg cgc gac gac cac gcc gtc atc gag aag				384
Val Gly Thr Gln Val Asp Leu Arg Asp Asp His Ala Val Ile Glu Lys				
115	120	125		
ctt gca cgt tca aag cag cgt cct gtg ccc ttt gag gcg ggt gag cgt				432
Leu Ala Arg Ser Lys Gln Arg Pro Val Pro Phe Glu Ala Gly Glu Arg				
130	135	140		
ttg gcg aga gag ttg ggt gcg gtc aag tac gtc gag tgc tcg gcg ctg				480
Leu Ala Arg Glu Leu Gly Ala Val Lys Tyr Val Glu Cys Ser Ala Leu				
145	150	155	160	
acg caa aag gga ttg aag aac gtc ttc gac gag gcc atc gtg gct gcg				528
Thr Gln Lys Gly Leu Lys Asn Val Phe Asp Glu Ala Ile Val Ala Ala				
165	170	175		
ctg gaa ccg cct gta atc cgc aag aag tcc aag tgc gcc att ctc				573
Leu Glu Pro Pro Val Ile Arg Lys Lys Ser Lys Cys Ala Ile Leu				
180	185	190		
tga				576

<210> 244

<211> 191

<212> PRT

<213> Ustilago maydis

<400> 244

Met Gln Thr Ile Lys Cys Val Val Val Gly Asp Gly Ala Val Gly Lys	
1	15
Thr Cys Leu Leu Ile Ser Tyr Thr Thr Asn Lys Phe Pro Ser Glu Tyr	
20	30
Val Pro Thr Val Phe Asp Asn Tyr Ala Val Thr Val Met Ile Gly Glu	
35	45
Asp Pro Tyr Thr Leu Gly Leu Phe Asp Thr Ala Gly Gln Glu Asp Tyr	
50	60
Asp Arg Leu Arg Pro Leu Ser Tyr Pro Gln Thr Asp Val Phe Leu Val	
65	75
Cys Phe Ser Val Thr Ser Pro Ala Ser Phe Glu Asn Val Lys Glu Lys	
85	95
Trp Phe Pro Glu Val His His His Cys Pro Gly Val Pro Cys Leu Ile	
100	110
Val Gly Thr Gln Val Asp Leu Arg Asp Asp His Ala Val Ile Glu Lys	
115	125
Leu Ala Arg Ser Lys Gln Arg Pro Val Pro Phe Glu Ala Gly Glu Arg	
130	140
Leu Ala Arg Glu Leu Gly Ala Val Lys Tyr Val Glu Cys Ser Ala Leu	
145	155
Thr Gln Lys Gly Leu Lys Asn Val Phe Asp Glu Ala Ile Val Ala Ala	
165	175
Leu Glu Pro Pro Val Ile Arg Lys Lys Ser Lys Cys Ala Ile Leu	

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180

185

190

<210> 245
 <211> 633
 <212> DNA
 <213> Encephalitozoon cuniculi

<220>
 <221> CDS
 <222> (1)..(633)

<400> 245
 atg aag gag aca aac tgg ata atg aac agt gaa aca cac cga tct gga 48
 Met Lys Glu Thr Asn Trp Ile Met Asn Ser Glu Thr His Arg Ser Gly
 1 5 10 15
 aaa gtt gtc att gtg gga gat gga gcc tgc ggt aaa aca tgt ctg ctc 96
 Lys Val Val Ile Val Gly Asp Gly Ala Cys Gly Lys Thr Cys Leu Leu
 20 25 30
 gag gtg ttt aga aga aac cag ttt cct gaa aca tac atc cca acc gtt 144
 Glu Val Phe Arg Arg Asn Gln Phe Pro Glu Thr Tyr Ile Pro Thr Val
 35 40 45
 gtc gac aac ttc gtg aag gaa gtg aag gtc gct gac gac aaa tat gtt 192
 Val Asp Asn Phe Val Lys Glu Val Lys Val Ala Asp Asp Lys Tyr Val
 50 55 60
 tcc tta gcc tta tgg gat act gca ggg caa gag gat tat gat aca atc 240
 Ser Leu Ala Leu Trp Asp Thr Ala Gly Gln Glu Asp Tyr Asp Thr Ile
 65 70 75 80
 agg cct ctt tca tac aag gag aca gat ctt gta cta ctg tgc tat aca 288
 Arg Pro Leu Ser Tyr Lys Glu Thr Asp Leu Val Leu Leu Cys Tyr Thr
 85 90 95
 ata gaa aac aag aag aaa atc cca aac atc tca aga aaa tgg ctg atg 336
 Ile Glu Asn Lys Lys Lys Ile Pro Asn Ile Ser Arg Lys Trp Leu Met
 100 105 110
 gag ata aag aac tac tgc ccc tcg tcg caa ttc ttt ctt atc ggg ttg 384
 Glu Ile Lys Asn Tyr Cys Pro Ser Ser Gln Phe Phe Leu Ile Gly Leu
 115 120 125
 aag aag gat ata agg gat atg gat gat ccg aca atc gac aag tcg tca 432
 Lys Lys Asp Ile Arg Asp Met Asp Asp Pro Thr Ile Asp Lys Ser Ser
 130 135 140
 ata gtc acg gaa agc gag ggt cgg aag atc gca gat aat atc aat gct 480
 Ile Val Thr Glu Ser Glu Gly Arg Lys Ile Ala Asp Asn Ile Asn Ala
 145 150 155 160
 gcg agg ttt ttt gag tgc tct gcc cgt acc aga gaa aac gtg aac ctt 528
 Ala Arg Phe Phe Glu Cys Ser Ala Arg Thr Arg Glu Asn Val Asn Leu
 165 170 175
 gta ttc gtg gaa gcc gca aag tat ata tgg gac acg aag cag gct gct 576
 Val Phe Val Glu Ala Ala Lys Tyr Ile Trp Asp Thr Lys Gln Ala Ala
 180 185 190
 tct gat gcc aga tcg tgt ggc ttt ttt tcg tgc ata aga tgc tgc cgt 624
 Ser Asp Ala Arg Ser Cys Gly Phe Phe Ser Cys Ile Arg Cys Cys Arg
 195 200 205
 tat aga tag 633
 Tyr Arg
 210

<210> 246
 <211> 210
 <212> PRT
 <213> Encephalitozoon cuniculi

<400> 246
 Met Lys Glu Thr Asn Trp Ile Met Asn Ser Glu Thr His Arg Ser Gly
 1 5 10 15
 Lys Val Val Ile Val Gly Asp Gly Ala Cys Gly Lys Thr Cys Leu Leu
 20 25 30
 Glu Val Phe Arg Arg Asn Gln Phe Pro Glu Thr Tyr Ile Pro Thr Val
 35 40 45

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Val Asp Asn Phe Val Lys Glu Val Lys Val Ala Asp Asp Lys Tyr Val
 50 55 60
 Ser Leu Ala Leu Trp Asp Thr Ala Gly Gln Glu Asp Tyr Asp Thr Ile
 65 70 75 80
 Arg Pro Leu Ser Tyr Lys Glu Thr Asp Leu Val Leu Leu Cys Tyr Thr
 85 90 95
 Ile Glu Asn Lys Lys Lys Ile Pro Asn Ile Ser Arg Lys Trp Leu Met
 100 105 110
 Glu Ile Lys Asn Tyr Cys Pro Ser Ser Gln Phe Phe Leu Ile Gly Leu
 115 120 125
 Lys Lys Asp Ile Arg Asp Met Asp Asp Pro Thr Ile Asp Lys Ser Ser
 130 135 140
 Ile Val Thr Glu Ser Glu Gly Arg Lys Ile Ala Asp Asn Ile Asn Ala
 145 150 155 160
 Ala Arg Phe Phe Glu Cys Ser Ala Arg Thr Arg Glu Asn Val Asn Leu
 165 170 175
 Val Phe Val Glu Ala Ala Lys Tyr Ile Trp Asp Thr Lys Gln Ala Ala
 180 185 190
 Ser Asp Ala Arg Ser Cys Gly Phe Phe Ser Cys Ile Arg Cys Cys Arg
 195 200 205
 Tyr Arg
 210

<210> 247

<211> 588

<212> DNA

<213> Mucor rouxii

<220>

<221> CDS

<222> (1) .. (588)

<400> 247

atg gct gaa atc aga cga aaa ctt gtg att gtt gga gat ggt gct tgt 48
 Met Ala Glu Ile Arg Arg Lys Leu Val Ile Val Gly Asp Gly Ala Cys
 1 5 10 15
 ggt aaa acc tgt ttg ttg att gtc ttt tca aag ggt act ttt cct gag 96
 Gly Lys Thr Cys Leu Leu Ile Val Phe Ser Lys Gly Thr Phe Pro Glu
 20 25 30
 ttc tat gtt ccc acc gtt ttt gaa aat tac gta gct gat gtc gaa gtc 144
 Phe Tyr Val Pro Thr Val Phe Glu Asn Tyr Val Ala Asp Val Glu Val
 35 40 45
 gat gga aaa cac gtg gaa tta gct tta tgg gat aca gca ggc caa gaa 192
 Asp Gly Lys His Val Glu Leu Ala Leu Trp Asp Thr Ala Gly Gln Glu
 50 55 60
 gat tat gat cgt ctc cgt ccc ttg tct tac cct gat tct cat gtt atc 240
 Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Asp Ser His Val Ile
 65 70 75 80
 ttg att tgt ttt gct gtt gat tca ccc gat tca ttg gaa aac gtt caa 288
 Leu Ile Cys Phe Ala Val Asp Ser Pro Asp Ser Leu Glu Asn Val Gln
 85 90 95
 gag aag tgg atc tct gaa gta ctc cac ttc tgt caa ggt tta cct att 336
 Glu Lys Trp Ile Ser Glu Val Leu His Phe Cys Gln Gly Leu Pro Ile
 100 105 110
 gtt tta gtt ggt tgt aag aaa gat tta aga aat gat cct gga aca att 384
 Val Leu Val Gly Cys Lys Lys Asp Leu Arg Asn Asp Pro Gly Thr Ile
 115 120 125
 gaa gaa ctt aga aga aac tct caa aaa cct gtc agt tca gaa gag ggt 432
 Glu Glu Leu Arg Arg Asn Ser Gln Lys Pro Val Ser Ser Glu Glu Gly
 130 135 140
 gct tct att gct caa aga att agt gct tac aag tac ctt gaa tgt tct 480
 Ala Ser Ile Ala Gln Arg Ile Ser Ala Tyr Lys Tyr Leu Glu Cys Ser
 145 150 155 160
 gcc aag act ggt gaa ggt gta cgt gaa gta ttt gaa cac gca aca aga 528
 Ala Lys Thr Gly Glu Gly Val Arg Glu Val Phe Glu His Ala Thr Arg
 165 170 175
 gct gca tta atg gtt tct aag aag aaa aag tca aag agt ggt gtc tgc 576
 Ala Ala Leu Met Val Ser Lys Lys Lys Lys Ser Lys Ser Gly Val Cys

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180
aac ctt ttg taa
Asn Leu Leu
195

185

190

588

<210> 248
<211> 195
<212> PRT
<213> Mucor rouxii

<400> 248
Met Ala Glu Ile Arg Arg Lys Leu Val Ile Val Gly Asp Gly Ala Cys
1 5 10 15
Gly Lys Thr Cys Leu Leu Ile Val Phe Ser Lys Gly Thr Phe Pro Glu
20 25 30
Phe Tyr Val Pro Thr Val Phe Glu Asn Tyr Val Ala Asp Val Glu Val
35 40 45
Asp Gly Lys His Val Glu Leu Ala Leu Trp Asp Thr Ala Gly Gln Glu
50 55 60
Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Asp Ser His Val Ile
65 70 75 80
Leu Ile Cys Phe Ala Val Asp Ser Pro Asp Ser Leu Glu Asn Val Gln
85 90 95
Glu Lys Trp Ile Ser Glu Val Leu His Phe Cys Gln Gly Leu Pro Ile
100 105 110
Val Leu Val Gly Cys Lys Lys Asp Leu Arg Asn Asp Pro Gly Thr Ile
115 120 125
Glu Glu Leu Arg Arg Asn Ser Gln Lys Pro Val Ser Ser Glu Glu Gly
130 135 140
Ala Ser Ile Ala Gln Arg Ile Ser Ala Tyr Lys Tyr Leu Glu Cys Ser
145 150 155 160
Ala Lys Thr Gly Glu Gly Val Arg Glu Val Phe Glu His Ala Thr Arg
165 170 175
Ala Ala Leu Met Val Ser Lys Lys Lys Lys Ser Lys Ser Gly Val Cys
180 185 190
Asn Leu Leu
195

<210> 249
<211> 1014
<212> DNA
<213> Neurospora crassa

<220>
<221> CDS
<222> (259)..(1014)

<400> 249
atgtcgtcgt caagcaagtt ccgcagctca caccactatc attcgcagtc ggtgtcgtca 60

atcctaggca ggcacgatag caccagcccc ggccgagaac tccaacgacg accgaccacc 120

acctcgtcct acacatcctc tggtagcgcc agccgacgag taccacgcga caacgggacg 180

agatcgagcg atgggacagt gagtaccatg atgagcacca catcgtcgac cggaagagaa 240

tcagcagcaa ctacggcc atg acc gag ggc ccg gcc tac tcc aag aag gtg 291
Met Thr Glu Gly Pro Ala Tyr Ser Lys Lys Val
1 5 10
gtg gtc gtg ggc gat ggc ggt tgc gga aag aca tgt ctc ctg atc agt 339
Val Val Val Gly Asp Gly Gly Cys Gly Lys Thr Cys Leu Leu Ile Ser
15 20 25
tat agt cag gga tac ttc cca gag aaa tat gtc cca acc gtc ttt gag 387

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Tyr	Ser	Gln	Gly	Tyr	Phe	Pro	Glu	Lys	Tyr	Val	Pro	Thr	Val	Phe	Glu		
		30					35					40					
aac	tac	atc	acc	tac	cca	acg	cat	cca	ccg	acc	ggg	aag	acc	gtc	gag	435	
Asn	Tyr	Ile	Thr	Tyr	Pro	Thr	His	Pro	Pro	Thr	Gly	Lys	Thr	Val	Glu		
		45				50					55						
ctc	gcc	ctg	tgg	gat	acc	gcc	ggc	caa	gag	gaa	tac	gac	cgc	ttg	cga	483	
Leu	Ala	Leu	Trp	Asp	Thr	Ala	Gly	Gln	Glu	Tyr	Asp	Arg	Leu	Arg			
		60				65				70				75			
ccg	ctt	tca	tac	cca	gaa	acc	gac	ctt	att	ttt	gtc	tgc	ttc	gcc	att	531	
Pro	Leu	Ser	Tyr	Pro	Glu	Thr	Asp	Leu	Ile	Phe	Val	Cys	Phe	Ala	Ile		
				80					85					90			
gac	tgc	ccc	aac	tcc	ctc	gag	aat	gtc	atg	gac	aag	tgg	tac	ccc	gaa	579	
Asp	Cys	Pro	Asn	Ser	Leu	Glu	Asn	Val	Met	Asp	Lys	Trp	Tyr	Pro	Glu		
			95					100					105				
gtc	ctc	cac	ttc	tgt	ccg	tat	aca	ccc	ctt	atc	ctc	gtc	ggc	ctc	aag	627	
Val	Leu	His	Phe	Cys	Pro	Tyr	Thr	Pro	Leu	Ile	Leu	Val	Gly	Leu	Lys		
		110					115					120					
tcc	gac	ctc	cgc	aat	aag	aag	acg	tgc	atc	gac	atg	ctc	aag	aca	caa	675	
Ser	Asp	Leu	Arg	Asn	Lys	Lys	Thr	Cys	Ile	Asp	Met	Leu	Lys	Thr	Gln		
		125				130				135							
ggg	ctc	acc	ccc	gtc	acc	acc	gaa	caa	gga	ctc	gcc	gtc	gct	aag	aag	723	
Gly	Leu	Thr	Pro	Val	Thr	Thr	Glu	Gln	Gly	Leu	Ala	Val	Ala	Lys	Lys		
		140				145				150				155			
atg	ggc	gct	cag	tac	atg	gag	tgc	tca	tca	aag	gag	atg	aag	ggg	gta	771	
Met	Gly	Ala	Gln	Tyr	Met	Glu	Cys	Ser	Ser	Lys	Glu	Met	Lys	Gly	Val		
			160					165						170			
gag	gag	att	ttt	gag	cag	gcc	atc	ctc	aca	gta	gtc	gcc	aac	gac	agg	819	
Glu	Glu	Ile	Phe	Glu	Gln	Ala	Ile	Leu	Thr	Val	Val	Ala	Asn	Asp	Arg		
			175					180						185			
aaa	aca	ctg	gaa	cag	gaa	gcc	gcg	aac	ggc	atg	ctg	ggg	gtt	ggc	gcg	867	
Lys	Thr	Leu	Glu	Gln	Glu	Ala	Ala	Asn	Gly	Met	Leu	Gly	Val	Gly	Ala		
		190					195					200					
ggc	tcg	gga	agc	gga	aag	ggc	agc	gga	atc	tcg	ttc	agc	agt	ggg	gac	915	
Gly	Ser	Gly	Ser	Gly	Lys	Gly	Ser	Gly	Ile	Ser	Phe	Ser	Ser	Gly	Asp		
		205				210				215							
aag	gcc	ggg	tcc	ggg	ata	ggg	ccc	gtc	aag	gcg	gcc	ggg	gtg	ggg	ggc	963	
Lys	Ala	Gly	Ser	Gly	Ile	Gly	Pro	Val	Lys	Ala	Ala	Gly	Val	Gly	Gly		
		220				225				230				235			
acg	att	gtc	ccg	aaa	acg	agg	aag	aag	aag	aga	aag	tgt	ggg	atg	atg	1011	
Thr	Ile	Val	Pro	Lys	Thr	Arg	Lys	Lys	Lys	Arg	Lys	Cys	Gly	Met	Met		
				240					245					250			
tga																1014	

<210> 250

<211> 251

<212> PRT

<213> Neurospora crassa

<400> 250

Met	Thr	Glu	Gly	Pro	Ala	Tyr	Ser	Lys	Lys	Val	Val	Val	Val	Gly	Asp		
				5					10					15			
Gly	Gly	Cys	Gly	Lys	Thr	Cys	Leu	Leu	Ile	Ser	Tyr	Ser	Gln	Gly	Tyr		
			20					25					30				
Phe	Pro	Glu	Lys	Tyr	Val	Pro	Thr	Val	Phe	Glu	Asn	Tyr	Ile	Thr	Tyr		
			35				40					45					
Pro	Thr	His	Pro	Pro	Thr	Gly	Lys	Thr	Val	Glu	Leu	Ala	Leu	Trp	Asp		
		50				55					60						
Thr	Ala	Gly	Gln	Glu	Glu	Tyr	Asp	Arg	Leu	Arg	Pro	Leu	Ser	Tyr	Pro		
		65			70					75				80			
Glu	Thr	Asp	Leu	Ile	Phe	Val	Cys	Phe	Ala	Ile	Asp	Cys	Pro	Asn	Ser		
			85					90					95				
Leu	Glu	Asn	Val	Met	Asp	Lys	Trp	Tyr	Pro	Glu	Val	Leu	His	Phe	Cys		
		100						105					110				
Pro	Tyr	Thr	Pro	Leu	Ile	Leu	Val	Gly	Leu	Lys	Ser	Asp	Leu	Arg	Asn		
		115					120						125				

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Lys Lys Thr Cys Ile Asp Met Leu Lys Thr Gln Gly Leu Thr Pro Val
 130 135 140
 Thr Thr Glu Gln Gly Leu Ala Val Ala Lys Lys Met Gly Ala Gln Tyr
 145 150 155 160
 Met Glu Cys Ser Ser Lys Glu Met Lys Gly Val Glu Glu Ile Phe Glu
 165 170 175
 Gln Ala Ile Leu Thr Val Val Ala Asn Asp Arg Lys Thr Leu Glu Gln
 180 185 190
 Glu Ala Ala Asn Gly Met Leu Gly Val Gly Ala Gly Ser Gly Ser Gly
 195 200 205
 Lys Gly Ser Gly Ile Ser Phe Ser Ser Gly Asp Lys Ala Gly Ser Gly
 210 215 220
 Ile Gly Pro Val Lys Ala Ala Gly Val Gly Thr Ile Val Pro Lys
 225 230 235 240
 Thr Arg Lys Lys Lys Arg Lys Cys Gly Met Met
 245 250

<210> 251

<211> 915

<212> DNA

<213> *Oryza sativa*

<220>

<221> CDS

<222> (85)..(678)

<400> 251

gggaccatca ctaccaccac ttcaccacca aacccaacca agaacaagtt ttcaggggca 60

aattaagaag agcttggtga cgat atg agc acg gcg agg ttc atc aag tgc 111
 Met Ser Thr Ala Arg Phe Ile Lys Cys
 1 5

gtc acc gtc ggc gac ggc gcc gtc ggc aag aca tgc atg ctc atc tcc 159
 Val Thr Val Gly Asp Gly Ala Val Gly Lys Thr Cys Met Leu Ile Ser
 10 15 20 25

tac acc agc aac act ttc ccc acg gat tat gtg ccg acg gtt ttc gac 207
 Tyr Thr Ser Asn Thr Phe Pro Thr Asp Tyr Val Pro Thr Val Phe Asp
 30 35 40

aac ttc agc gcc aac gtg gtc gtc gac ggc aac acg gtg aac ctt ggg 255
 Asn Phe Ser Ala Asn Val Val Val Asp Gly Asn Thr Val Asn Leu Gly
 45 50 55

ctc tgg gat act gct gga caa gag gat tac aat agg ctg agg cct ctc 303
 Leu Trp Asp Thr Ala Gly Gln Glu Asp Tyr Asn Arg Leu Arg Pro Leu
 60 65 70

agc tac aga gga gct gat gtc ttt tta cta gca ttt tcc ctc atc agc 351
 Ser Tyr Arg Gly Ala Asp Val Phe Leu Leu Ala Phe Ser Leu Ile Ser
 75 80 85

aaa gcg agc tat gag aat att cac aag aag tgg ata cca gag ctg agg 399
 Lys Ala Ser Tyr Glu Asn Ile His Lys Lys Trp Ile Pro Glu Leu Arg
 90 95 100 105

cat tat gct cct aat gtg cca atc gta tta gtt gga acc aag ctt gac 447
 His Tyr Ala Pro Asn Val Pro Ile Val Leu Val Gly Thr Lys Leu Asp
 110 115 120

ttg cgt gag gac aag cag ttc ttc ctg gac cac cct ggt cta gca cct 495
 Leu Arg Glu Asp Lys Gln Phe Phe Leu Asp His Pro Gly Leu Ala Pro
 125 130 135

att tcc act gca cag ggg gag gag ctg aag agg atg ata ggt gct gcg 543
 Ile Ser Thr Ala Gln Gly Glu Glu Leu Lys Arg Met Ile Gly Ala Ala
 140 145 150

gcg tac atc gaa tgc agc tcc aag acg cag cag aat gtg aaa tca gta 591
 Ala Tyr Ile Glu Cys Ser Ser Lys Thr Gln Gln Asn Val Lys Ser Val
 155 160 165

ttc gac tcg gcg atc aaa gtt gta ctt tgc ccg cca aag ccg aag aag 639
 Phe Asp Ser Ala Ile Lys Val Val Leu Cys Pro Pro Lys Pro Lys Lys
 170 175 180 185

aag aac acc agg aag cag agg agt tgc tgg atc cta tgagtataa 685
 Lys Asn Thr Arg Lys Gln Arg Ser Cys Trp Ile Leu

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190 195
 acagcaagat tggcgtattc cgcaggaaac ctgtattatt tttacagtgt gtgttggtgt 745
 atgtttgtgt gttgcagatt agatgcagtt tgggttacaa aatttgctgg gtctgaaata 805
 ttcagctcag tgcttcttga gtactacctc tgatgattct tacaaaagtg ttctttgggtt 865
 ggttcagata tatatattat gattattata aaaaaaaaaa aaaaaaaaaa 915

<210> 252

<211> 197

<212> PRT

<213> Oryza sativa

<400> 252

Met Ser Thr Ala Arg Phe Ile Lys Cys Val Thr Val Gly Asp Gly Ala
 1 5 10 15
 Val Gly Lys Thr Cys Met Leu Ile Ser Tyr Thr Ser Asn Thr Phe Pro
 20 25 30
 Thr Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val Val
 35 40 45
 Val Asp Gly Asn Thr Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln
 50 55 60
 Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp Val
 65 70 75 80
 Phe Leu Leu Ala Phe Ser Leu Ile Ser Lys Ala Ser Tyr Glu Asn Ile
 85 90 95
 His Lys Lys Trp Ile Pro Glu Leu Arg His Tyr Ala Pro Asn Val Pro
 100 105 110
 Ile Val Leu Val Gly Thr Lys Leu Asp Leu Arg Glu Asp Lys Gln Phe
 115 120 125
 Phe Leu Asp His Pro Gly Leu Ala Pro Ile Ser Thr Ala Gln Gly Glu
 130 135 140
 Glu Leu Lys Arg Met Ile Gly Ala Ala Ala Tyr Ile Glu Cys Ser Ser
 145 150 155 160
 Lys Thr Gln Gln Asn Val Lys Ser Val Phe Asp Ser Ala Ile Lys Val
 165 170 175
 Val Leu Cys Pro Pro Lys Pro Lys Lys Lys Asn Thr Arg Lys Gln Arg
 180 185 190
 Ser Cys Trp Ile Leu
 195

<210> 253

<211> 1010

<212> DNA

<213> Zea mays

<220>

<221> CDS

<222> (74)..(718)

<400> 253

cactccgtcc ctctcctcca ggaccgcccg ctcttatccc gtttctccct tctctgggct 60
 cggagaatcg gag atg gcg tcc agc gcc tct cgg ttc atc aag tgc gtc 109
 Met Ala Ser Ser Ala Ser Arg Phe Ile Lys Cys Val 10
 1 5
 acg gtc gcc gac ggt gcc gtg ggc aag aca tgt atg ctc atc tgc tac 157
 Thr Val Gly Asp Gly Ala Val Gly Lys Thr Cys Met Leu Ile Cys Tyr 15 20 25
 acc agc aac aag ttc ccc act gat tac ata ccc acg gtg ttc gac aat 205

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Thr	Ser	Asn	Lys	Phe	Pro	Thr	Asp	Tyr	Ile	Pro	Thr	Val	Phe	Asp	Asn		
30						35					40						
ttc	agt	gca	aat	gtc	gtt	gtg	gat	ggc	acc	acg	gtg	aat	ttg	ggc	ctg		253
Phe	Ser	Ala	Asn	Val	Val	Val	Asp	Gly	Thr	Thr	Val	Asn	Leu	Gly	Leu		
45					50					55					60		
tgg	gat	acc	gca	ggg	cag	gaa	gat	tac	aac	cga	ctg	agg	cct	cta	agc		301
Trp	Asp	Thr	Ala	Gly	Gln	Glu	Asp	Tyr	Asn	Arg	Leu	Arg	Pro	Leu	Ser		
				65					70					75			
tac	cgt	ggg	gca	gat	gtt	ttc	gtg	ctt	gca	ttc	tca	ctt	gtg	agt	cga		349
Tyr	Arg	Gly	Ala	Asp	Val	Phe	Val	Leu	Ala	Phe	Ser	Leu	Val	Ser	Arg		
			80					85					90				
gct	agc	tat	gag	aat	atc	atg	aag	aag	tgg	ata	ccg	gag	ctt	cag	cat		397
Ala	Ser	Tyr	Glu	Asn	Ile	Met	Lys	Lys	Trp	Ile	Pro	Glu	Leu	Gln	His		
		95					100					105					
tat	gca	cgt	ggg	gtg	cct	gtt	gtg	ttg	gta	ggc	aca	aaa	ttt	gat	ctt		445
Tyr	Ala	Arg	Gly	Val	Pro	Val	Val	Leu	Val	Gly	Thr	Lys	Phe	Asp	Leu		
	110					115					120						
cgt	gaa	gac	aag	cac	tac	ttg	atg	gac	cat	cct	ggg	ttg	gtg	cct	gtt		493
Arg	Glu	Asp	Lys	His	Tyr	Leu	Met	Asp	His	Pro	Gly	Leu	Val	Pro	Val		
					130					135					140		
acc	aca	gca	caa	ggg	gag	gaa	ctt	cgt	aga	caa	att	ggg	gct	atg	tat		541
Thr	Thr	Ala	Gln	Gly	Glu	Glu	Leu	Arg	Arg	Gln	Ile	Gly	Ala	Met	Tyr		
			145					150					155				
tac	atc	gaa	tcg	agt	tcg	aag	aca	cag	cag	aat	gtc	aaa	gct	gtg	ttc		589
Tyr	Ile	Glu	Cys	Ser	Ser	Lys	Thr	Gln	Gln	Asn	Val	Lys	Ala	Val	Phe		
			160				165						170				
gat	gct	gcc	atc	aag	gtt	gta	atc	cag	cct	cca	act	aaa	cta	aga	gaa		637
Asp	Ala	Ala	Ile	Lys	Val	Val	Ile	Gln	Pro	Pro	Thr	Lys	Leu	Arg	Glu		
		175					180					185					
aag	aag	aaa	aag	aaa	tca	cgc	aag	gga	tgt	tcg	atg	gtg	aac	atc	tta		685
Lys	Lys	Lys	Lys	Lys	Ser	Arg	Lys	Gly	Cys	Ser	Met	Val	Asn	Ile	Leu		
		190				195					200						
tct	gga	aga	aaa	atg	cta	tgc	ttc	aag	tcc	tgaatgatcg	aaggggggtct						735
Ser	Gly	Arg	Lys	Met	Leu	Cys	Phe	Lys	Ser								
205					210												
tacctgaact	aataccatga	gtgtgacccc	aagttcgca	agcttgaaat	cttgatgcgc												795
tcggttgcgca	tgtatatttg	cacctttggt	tattaatcac	tagaggtaga	tgattgaaac												855
taatctgctt	aaccaatgtg	cactgctggg	cgctggcgty	gtagctata	tcagttaggc												915
agttcgacag	aggtcaaaga	gattgagatt	ttgttctttc	ttggcaatgt	cacagctttt												975
gtgaaaaaaa	aaaaaaaaaa	aaaaaaaaaa	aaaaa														1010

<210> 254

<211> 214

<212> PRT

<213> Zea mays

<400> 254

Met	Ala	Ser	Ser	Ala	Ser	Arg	Phe	Ile	Lys	Cys	Val	Thr	Val	Gly	Asp		
1				5					10					15			
Gly	Ala	Val	Gly	Lys	Thr	Cys	Met	Leu	Ile	Cys	Tyr	Thr	Ser	Asn	Lys		
			20					25					30				
Phe	Pro	Thr	Asp	Tyr	Ile	Pro	Thr	Val	Phe	Asp	Asn	Phe	Ser	Ala	Asn		
		35					40					45					
Val	Val	Val	Asp	Gly	Thr	Thr	Val	Asn	Leu	Gly	Leu	Trp	Asp	Thr	Ala		
		50				55					60						
Gly	Gln	Glu	Asp	Tyr	Asn	Arg	Leu	Arg	Pro	Leu	Ser	Tyr	Arg	Gly	Ala		
65					70					75					80		

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Asp Val Phe Val Leu Ala Phe Ser Leu Val Ser Arg Ala Ser Tyr Glu
 85 90 95
 Asn Ile Met Lys Lys Trp Ile Pro Glu Leu Gln His Tyr Ala Arg Gly
 100 105 110
 Val Pro Val Val Leu Val Gly Thr Lys Phe Asp Leu Arg Glu Asp Lys
 115 120 125
 His Tyr Leu Met Asp His Pro Gly Leu Val Pro Val Thr Thr Ala Gln
 130 135 140
 Gly Glu Glu Leu Arg Arg Gln Ile Gly Ala Met Tyr Tyr Ile Glu Cys
 145 150 155 160
 Ser Ser Lys Thr Gln Gln Asn Val Lys Ala Val Phe Asp Ala Ala Ile
 165 170 175
 Lys Val Val Ile Gln Pro Pro Thr Lys Leu Arg Glu Lys Lys Lys
 180 185 190
 Lys Ser Arg Lys Gly Cys Ser Met Val Asn Ile Leu Ser Gly Arg Lys
 195 200 205
 Met Leu Cys Phe Lys Ser
 210

<210> 255

<211> 579

<212> DNA

<213> Schizophyllum commune

<220>

<221> CDS

<222> (1)..(579)

<400> 255

atg cag acc atc aag tgt gta gtt gtt gga gac ggt gcg gtt gga aag	48
Met Gln Thr Ile Lys Cys Val Val Val Gly Asp Gly Ala Val Gly Lys	
1 5 10 15	
acg tgc ctg ttg atc tcc tat acg acc aac aag ttc ccg agc gag tat	96
Thr Cys Leu Ile Ser Tyr Thr Thr Asn Lys Phe Pro Ser Glu Tyr	
20 25 30	
gtg ccc acc gtc ttc gac aat tat gcc gtg acc gtc atg atc ggc gag	144
Val Pro Thr Val Phe Asp Asn Tyr Ala Val Thr Val Met Ile Gly Glu	
35 40 45	
gac ccc tat aca ctg ggt ctg ttt gat act gct ggc cag gag gat tac	192
Asp Pro Tyr Thr Leu Gly Leu Phe Asp Thr Ala Gly Gln Glu Asp Tyr	
50 55 60	
gat cga ctc cgg ccg ttg tgc tac ccg cag acg gac gtg ttt ctt gtg	240
Asp Arg Leu Arg Pro Leu Ser Tyr Pro Gln Thr Asp Val Phe Leu Val	
65 70 75 80	
tgc ttt agt gta aca tct cca gcc tcc ttc gag aac gta aag gag aaa	288
Cys Phe Ser Val Thr Ser Pro Ala Ser Phe Glu Asn Val Lys Glu Lys	
85 90 95	
tgg ttc ccg gag gtt cgc cac cac tgt ccg ggc gtg ccc tgc ctc atc	336
Trp Phe Pro Glu Val Arg His His Cys Pro Gly Val Pro Cys Leu Ile	
100 105 110	
gtc ggc acg caa atc gac ttg agg gac gac tgc cag gtg atc gag aag	384
Val Gly Thr Gln Ile Asp Leu Arg Asp Asp Ser Gln Val Ile Glu Lys	
115 120 125	
ctg gcg cgg caa aag cag aga ccg gtc acg agc gac caa ggc gag cgg	432
Leu Ala Arg Gln Lys Gln Arg Pro Val Thr Ser Asp Gln Gly Glu Arg	
130 135 140	
ctc gtt cgg gaa ctt ggc gcg gtc aag tac gtc gag tgc tca gca ctc	480
Leu Val Arg Glu Leu Gly Ala Val Lys Tyr Val Glu Cys Ser Ala Leu	
145 150 155 160	
acg cag aag gga ttg aag aac gtg ttt gat gag gcc atc gtc gcc gcg	528
Thr Gln Lys Gly Leu Lys Asn Val Phe Asp Glu Ala Ile Val Ala Ala	
165 170 175	
ctg gag cca ccc gtg gtg aag aag aag ggg ccg aaa tgt gtc atc ctt	576
Leu Glu Pro Pro Val Val Lys Lys Lys Gly Pro Lys Cys Val Ile Leu	
180 185 190	
tga	579

<210> 256
 <211> 192
 <212> PRT
 <213> Schizophyllum commune

<400> 256
 Met Gln Thr Ile Lys Cys Val Val Val Gly Asp Gly Ala Val Gly Lys
 1 5 10 15
 Thr Cys Leu Leu Ile Ser Tyr Thr Thr Asn Lys Phe Pro Ser Glu Tyr
 20 25 30
 Val Pro Thr Val Phe Asp Asn Tyr Ala Val Thr Val Met Ile Gly Glu
 35 40 45
 Asp Pro Tyr Thr Leu Gly Leu Phe Asp Thr Ala Gly Gln Glu Asp Tyr
 50 55 60
 Asp Arg Leu Arg Pro Leu Ser Tyr Pro Gln Thr Asp Val Phe Leu Val
 65 70 75 80
 Cys Phe Ser Val Thr Ser Pro Ala Ser Phe Glu Asn Val Lys Glu Lys
 85 90 95
 Trp Phe Pro Glu Val Arg His His Cys Pro Gly Val Pro Cys Leu Ile
 100 105 110
 Val Gly Thr Gln Ile Asp Leu Arg Asp Asp Ser Gln Val Ile Glu Lys
 115 120 125
 Leu Ala Arg Gln Lys Gln Arg Pro Val Thr Ser Asp Gln Gly Glu Arg
 130 135 140
 Leu Val Arg Glu Leu Gly Ala Val Lys Tyr Val Glu Cys Ser Ala Leu
 145 150 155 160
 Thr Gln Lys Gly Leu Lys Asn Val Phe Asp Glu Ala Ile Val Ala Ala
 165 170 175
 Leu Glu Pro Pro Val Val Lys Lys Lys Gly Pro Lys Cys Val Ile Leu
 180 185 190

<210> 257
 <211> 1075
 <212> DNA
 <213> Aspergillus fumigatus

<220>
 <221> CDS
 <222> (197)..(793)

<400> 257
 ttaacctcca aaagatatac ccttaaagat tattatcgcc ccatccgcct tcacttgacg 60
 ctaaaccccc ccaagaattc acttcgacgc taattgatcg ctatcatttg ggttcattctt 120
 tacaagctgt tcatcatcaa atcctctctg tgattttctt ctctgtgcat atattcttaa 180
 ttccaacaac aaaaac atg gcg tcc ggc ccc gct act cag tca tta aag tgt 232
 Met Ala Ser Gly Pro Ala Thr Gln Ser Leu Lys Cys
 1 5 10
 gtg gtg aca ggt gat ggt gca gtt gga aag aca tgc ctc ctc atc tcg 280
 Val Val Thr Gly Asp Gly Ala Val Gly Lys Thr Cys Leu Leu Ile Ser
 15 20 25
 tat acc acc aat gca ttc ccc gga gaa tac atc cct acc gta ttt gac 328
 Tyr Thr Thr Asn Ala Phe Pro Gly Glu Tyr Ile Pro Thr Val Phe Asp
 30 35 40
 aac tat acg gct agt gtg atg gta gat ggt agg ccc atc agc ttg gga 376
 Asn Tyr Thr Ala Ser Val Met Val Asp Gly Arg Pro Ile Ser Leu Gly
 45 50 55 60
 ctg tgg gat act gct ggg caa gaa gat tat gac cga ctg aga ccg ctg 424
 Leu Trp Asp Thr Ala Gly Gln Glu Asp Tyr Asp Arg Leu Arg Pro Leu
 65 70 75
 tcc tac cct caa acc gac gtc ttc ctc atc tgc ttc tcc att gtc agc 472

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Ser	Tyr	Pro	Gln	Thr	Asp	Val	Phe	Leu	Ile	Cys	Phe	Ser	Ile	Val	Ser		
			80					85					90				
cct	cct	tcg	ttt	gac	aac	gtc	aag	gca	aag	tgg	tac	ccg	gag	att	gag		520
Pro	Pro	Ser	Phe	Asp	Asn	Val	Lys	Ala	Lys	Trp	Tyr	Pro	Glu	Ile	Glu		
		95					100					105					
cac	cat	gcc	ccc	aat	gtt	ccc	atc	atc	ctt	gtt	ggg	acc	aaa	ctc	gat		568
His	His	Ala	Pro	Asn	Val	Pro	Ile	Ile	Leu	Val	Gly	Thr	Lys	Leu	Asp		
		110					115				120						
ctg	aga	gac	gat	ccc	gcg	aca	gca	gaa	tcc	ctc	cgg	cag	aaa	aag	atg		616
Leu	Arg	Asp	Asp	Pro	Ala	Thr	Ala	Glu	Ser	Leu	Arg	Gln	Lys	Lys	Met		
		125			130					135					140		
gac	ctg	tct	cgt	acg	aga	cac	tgg	ccg	tcg	cca	aaa	gag	atc	cga	gcg		664
Asp	Leu	Ser	Arg	Thr	Arg	His	Trp	Pro	Ser	Pro	Lys	Glu	Ile	Arg	Ala		
			145					150						155			
cac	aag	tat	ctc	gaa	tgt	tct	gcc	ctc	agg	cag	cgc	aac	ttc	aaa	agc		712
His	Lys	Tyr	Leu	Glu	Cys	Ser	Ala	Leu	Arg	Gln	Arg	Asn	Phe	Lys	Ser		
		160					165					170					
gtc	ttt	gat	gaa	gcc	att	cgt	gct	gtc	ctc	aac	cct	gga	cct	gcc	gca		760
Val	Phe	Asp	Glu	Ala	Ile	Arg	Ala	Val	Leu	Asn	Pro	Gly	Pro	Ala	Ala		
		175					180				185						
aaa	ccg	aag	agc	aag	aaa	tgc	acc	ata	ctg	tagaccatta	ctttcagctt						810
Lys	Pro	Lys	Ser	Lys	Lys	Cys	Thr	Ile	Leu								
		190				195											
ttcatcatct	aatcataaac	aactaattcg	gcgtctggga	tagttgaagg	ttttgcaatg												870
atcccccttga	tgattgttcc	aactgtgttc	atattttcttt	ctctctttct	cggtcacatg												930
tcatgatcct	gatgagcttc	tttctgggtc	aggacacccc	tttctctatc	ttgtcgtctt												990
tttgtgcaca	tcgagcataa	acttgtaaca	tgctacgcca	taacaggaag	ctgtcactta												1050
atcgatttaa	cctccattgt	cctaa															1075

<210> 258

<211> 198

<212> PRT

<213> *Aspergillus fumigatus*

<400> 258

Met	Ala	Ser	Gly	Pro	Ala	Thr	Gln	Ser	Leu	Lys	Cys	Val	Val	Thr	Gly		
				5					10					15			
Asp	Gly	Ala	Val	Gly	Lys	Thr	Cys	Leu	Leu	Ile	Ser	Tyr	Thr	Thr	Asn		
			20					25					30				
Ala	Phe	Pro	Gly	Glu	Tyr	Ile	Pro	Thr	Val	Phe	Asp	Asn	Tyr	Thr	Ala		
		35					40				45						
Ser	Val	Met	Val	Asp	Gly	Arg	Pro	Ile	Ser	Leu	Gly	Leu	Trp	Asp	Thr		
		50				55					60						
Ala	Gly	Gln	Glu	Asp	Tyr	Asp	Arg	Leu	Arg	Pro	Leu	Ser	Tyr	Pro	Gln		
		65				70				75					80		
Thr	Asp	Val	Phe	Leu	Ile	Cys	Phe	Ser	Ile	Val	Ser	Pro	Pro	Ser	Phe		
			85					90						95			
Asp	Asn	Val	Lys	Ala	Lys	Trp	Tyr	Pro	Glu	Ile	Glu	His	His	Ala	Pro		
		100						105						110			
Asn	Val	Pro	Ile	Ile	Leu	Val	Gly	Thr	Lys	Leu	Asp	Leu	Arg	Asp	Asp		
		115					120					125					
Pro	Ala	Thr	Ala	Glu	Ser	Leu	Arg	Gln	Lys	Lys	Met	Asp	Leu	Ser	Arg		
		130				135					140						
Thr	Arg	His	Trp	Pro	Ser	Pro	Lys	Glu	Ile	Arg	Ala	His	Lys	Tyr	Leu		
		145				150				155					160		
Glu	Cys	Ser	Ala	Leu	Arg	Gln	Arg	Asn	Phe	Lys	Ser	Val	Phe	Asp	Glu		
			165					170						175			

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Ala Ile Arg Ala Val Leu Asn Pro Gly Pro Ala Ala Lys Pro Lys Ser
 180 185 190
 Lys Lys Cys Thr Ile Leu
 195

<210> 259

<211> 594

<212> DNA

<213> *Aspergillus fumigatus*

<220>

<221> CDS

<222> (1)..(594)

<400> 259

atg	gag	ctg	tgc	ggg	cgc	cag	aaa	gtt	gtc	cag	cgc	aag	atg	gta	ctc	48
Met	Glu	Leu	Cys	Gly	Arg	Gln	Lys	Val	Val	Gln	Arg	Lys	Met	Val	Leu	
1			5					10					15			
tta	gga	gat	ggt	gct	tgc	ggc	aag	acg	tca	gct	ttg	aat	gtg	ttt	aca	96
Leu	Gly	Asp	Gly	Ala	Cys	Gly	Lys	Thr	Ser	Ala	Leu	Asn	Val	Phe	Thr	
			20					25					30			
aga	ggg	ttc	ttc	ccg	aca	gtc	tat	gag	ccg	act	gtt	ttt	gaa	aac	tat	144
Arg	Gly	Phe	Phe	Pro	Thr	Val	Tyr	Glu	Pro	Thr	Val	Phe	Glu	Asn	Tyr	
			35				40					45				
gtc	cat	gac	att	ttc	gtc	gat	aac	gta	cac	atg	gag	ttg	tcg	ctg	tgg	192
Val	His	Asp	Ile	Phe	Val	Asp	Asn	Val	His	Met	Glu	Leu	Ser	Leu	Trp	
			50				55				60					
gat	aca	gcc	ggt	caa	gaa	gaa	ttc	gat	cga	tta	cga	gca	ctg	tcc	tac	240
Asp	Thr	Ala	Gly	Gln	Glu	Phe	Asp	Arg	Leu	Arg	Ala	Leu	Ser	Tyr		
			65			70			75				80			
gag	gat	aca	cat	gtt	att	atg	cta	tgt	ttc	agc	gtc	gat	agc	cct	gac	288
Glu	Asp	Thr	His	Val	Ile	Met	Leu	Cys	Phe	Ser	Val	Asp	Ser	Pro	Asp	
			85					90					95			
tcg	ttc	gaa	aat	gtg	gcg	acg	aaa	tgg	att	gat	gag	att	cgc	gag	aat	336
Ser	Phe	Glu	Asn	Val	Ala	Thr	Lys	Trp	Ile	Asp	Glu	Ile	Arg	Glu	Asn	
			100					105					110			
tgc	ccc	ggc	gtg	aag	tta	gtc	ctc	acg	gca	ctc	aaa	tgc	gat	ctg	cga	384
Cys	Pro	Gly	Val	Lys	Leu	Val	Leu	Thr	Ala	Leu	Lys	Cys	Asp	Leu	Arg	
			115				120					125				
aaa	gac	gac	gag	ttg	aac	gac	aac	ccg	aac	gcc	atc	acg	ttc	gaa	caa	432
Lys	Asp	Asp	Glu	Leu	Asn	Asp	Asn	Pro	Asn	Ala	Ile	Thr	Phe	Glu	Gln	
			130				135				140					
gga	tta	gcg	aaa	gca	aag	gaa	atc	ggc	gct	gta	aaa	tac	ctt	gaa	tgc	480
Gly	Leu	Ala	Lys	Ala	Lys	Glu	Ile	Gly	Ala	Val	Lys	Tyr	Leu	Glu	Cys	
			145			150			155					160		
tct	gct	gtt	cag	aat	cgc	ggt	atc	agg	gag	acc	ttt	tat	gaa	gcc	gcc	528
Ser	Ala	Val	Gln	Asn	Arg	Gly	Ile	Arg	Glu	Thr	Phe	Tyr	Glu	Ala	Ala	
			165					170					175			
aag	gtc	gct	ctt	gat	gtg	aag	cct	gca	gga	tcc	agc	ggg	tcc	aag	gga	576
Lys	Val	Ala	Leu	Asp	Val	Lys	Pro	Ala	Gly	Ser	Ser	Gly	Ser	Lys	Gly	
			180					185					190			
cag	tgc	att	atc	ctc	tga											594
Gln	Cys	Ile	Ile	Leu												
			195													

<210> 260

<211> 197

<212> PRT

<213> *Aspergillus fumigatus*

<400> 260

Met	Glu	Leu	Cys	Gly	Arg	Gln	Lys	Val	Val	Gln	Arg	Lys	Met	Val	Leu	
1			5					10					15			
Leu	Gly	Asp	Gly	Ala	Cys	Gly	Lys	Thr	Ser	Ala	Leu	Asn	Val	Phe	Thr	
			20					25					30			
Arg	Gly	Phe	Phe	Pro	Thr	Val	Tyr	Glu	Pro	Thr	Val	Phe	Glu	Asn	Tyr	
			35				40					45				

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Val His Asp Ile Phe Val Asp Asn Val His Met Glu Leu Ser Leu Trp
 50 55 60
 Asp Thr Ala Gly Gln Glu Glu Phe Asp Arg Leu Arg Ala Leu Ser Tyr
 65 70 75 80
 Glu Asp Thr His Val Ile Met Leu Cys Phe Ser Val Asp Ser Pro Asp
 85 90 95
 Ser Phe Glu Asn Val Ala Thr Lys Trp Ile Asp Glu Ile Arg Glu Asn
 100 105 110
 Cys Pro Gly Val Lys Leu Val Leu Thr Ala Leu Lys Cys Asp Leu Arg
 115 120 125
 Lys Asp Asp Glu Leu Asn Asp Asn Pro Asn Ala Ile Thr Phe Glu Gln
 130 135 140
 Gly Leu Ala Lys Ala Lys Glu Ile Gly Ala Val Lys Tyr Leu Glu Cys
 145 150 155 160
 Ser Ala Val Gln Asn Arg Gly Ile Arg Glu Thr Phe Tyr Glu Ala Ala
 165 170 175
 Lys Val Ala Leu Asp Val Lys Pro Ala Gly Ser Ser Gly Ser Lys Gly
 180 185 190
 Gln Cys Ile Ile Leu
 195

<210> 261
 <211> 582
 <212> DNA
 <213> Mus musculus

<220>
 <221> CDS
 <222> (1)..(582)

<400> 261
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 Met Ala Ala Ile Arg Lys Lys Leu Val Ile Val Gly Asp Gly Ala Cys
 1 5 10 15
 gga aaa aca tgt ttg ctc atc gtc ttc agc aag gac cag ttt cct gag 96
 Gly Lys Thr Cys Leu Leu Ile Val Phe Ser Lys Asp Gln Phe Pro Glu
 20 25 30
 gtt tac gtg ccc aca gta ttt gag aac tat gtg gct gat atc gaa gtg 144
 Val Tyr Val Pro Thr Val Phe Glu Asn Tyr Val Ala Asp Ile Glu Val
 35 40 45
 gat gga aaa cag gtg gag ttg gcc ctg tgg gat aca gct gga caa gaa 192
 Asp Gly Lys Gln Val Glu Leu Ala Leu Trp Asp Thr Ala Gly Gln Glu
 50 55 60
 gat tat gat cgc ctg agg cca ctc tcc tat ccc gac act gat gtt ctc 240
 Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Asp Thr Asp Val Leu
 65 70 75 80
 ttg tta tgt ttc tcc att ggc aac cct gat agc ttt ggg aac atc cca 288
 Leu Leu Cys Phe Ser Ile Gly Asn Pro Asp Ser Phe Gly Asn Ile Pro
 85 90 95
 cat aaa tgg att cca gaa gtc aag cat ttc tgt ccc aac gtg ccc atc 336
 His Lys Trp Ile Pro Glu Val Lys His Phe Cys Pro Asn Val Pro Ile
 100 105 110
 atc ctg gtt ggg agt aag aag gat ctt cgg aat gac ttc tac acg ata 384
 Ile Leu Val Gly Ser Lys Lys Asp Leu Arg Asn Asp Phe Tyr Thr Ile
 115 120 125
 caa gag tta gcc aag agg aag caa gcg cct gtg aga cct gaa caa ggc 432
 Gln Glu Leu Ala Lys Arg Lys Gln Ala Pro Val Arg Pro Glu Gln Gly
 130 135 140
 caa ggg ttg gcg aac agc att ggc gct ttc gag tat gtg gag tgt tca 480
 Gln Gly Leu Ala Asn Ser Ile Gly Ala Phe Glu Tyr Val Glu Cys Ser
 145 150 155 160
 gcg aag acc aaa gat gga gtg agg agg gtc ttt gaa aag gcc aca agg 528
 Ala Lys Thr Lys Asp Gly Val Arg Arg Val Phe Glu Lys Ala Thr Arg
 165 170 175
 gct gct ctg caa acg aat cga gtg aag aaa aag act ggt tgc ttt gtc 576
 Ala Ala Leu Gln Thr Asn Arg Val Lys Lys Lys Thr Gly Cys Phe Val
 180 185 190
 ttt tga 582

Phe

<210> 262

<211> 193

<212> PRT

<213> Mus musculus

<400> 262

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Met Ala Ala Ile Arg Lys Lys Leu Val Ile Val Gly Asp Gly Ala Cys
1      5      10      15
Gly Lys Thr Cys Leu Leu Ile Val Phe Ser Lys Asp Gln Phe Pro Glu
20      25      30
Val Tyr Val Pro Thr Val Phe Glu Asn Tyr Val Ala Asp Ile Glu Val
35      40      45
Asp Gly Lys Gln Val Glu Leu Ala Leu Trp Asp Thr Ala Gly Gln Glu
50      55      60
Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Asp Thr Asp Val Leu
65      70      75      80
Leu Leu Cys Phe Ser Ile Gly Asn Pro Asp Ser Phe Gly Asn Ile Pro
85      90      95
His Lys Trp Ile Pro Glu Val Lys His Phe Cys Pro Asn Val Pro Ile
100     105     110
Ile Leu Val Gly Ser Lys Lys Asp Leu Arg Asn Asp Phe Tyr Thr Ile
115     120     125
Gln Glu Leu Ala Lys Arg Lys Gln Ala Pro Val Arg Pro Glu Gln Gly
130     135     140
Gln Gly Leu Ala Asn Ser Ile Gly Ala Phe Glu Tyr Val Glu Cys Ser
145     150     155     160
Ala Lys Thr Lys Asp Gly Val Arg Arg Val Phe Glu Lys Ala Thr Arg
165     170     175
Ala Ala Leu Gln Thr Asn Arg Val Lys Lys Lys Thr Gly Cys Phe Val
180     185     190
Phe

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<210> 263

<211> 576

<212> DNA

<213> Mus musculus

<220>

<221> CDS

<222> (1)..(576)

<400> 263

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atg ctg agc tca atc aag tgc gtg ctg gta ggg gac agt gct gtg ggg      48
Met Leu Ser Ser Ile Lys Cys Val Leu Val Gly Asp Ser Ala Val Gly
1      5      10      15
aaa acc tca ctg ttg gtg cgc ttc acc tct gag acc ttc ccg gag gcc      96
Lys Thr Ser Leu Leu Val Arg Phe Thr Ser Glu Thr Phe Pro Glu Ala
20      25      30
tac aaa ccc acg gtg tac gag aat acg ggt gta gac gtc ttc atg gat      144
Tyr Lys Pro Thr Val Tyr Glu Asn Thr Gly Val Asp Val Phe Met Asp
35      40      45
ggc atc cag atc agc ctg ggt ctc tgg gac act gcc ggc aac gac gcc      192
Gly Ile Gln Ile Ser Leu Gly Leu Trp Asp Thr Ala Gly Asn Asp Ala
50      55      60
ttc aga agt atc cgg ccc ctg tcc tac cag cag gca gac gtg gta ctg      240
Phe Arg Ser Ile Arg Pro Leu Ser Tyr Gln Gln Ala Asp Val Val Leu
65      70      75      80
atg tgc tac tct gtg gcc aac cat aac tcg ttc ctg aac ttg aag aac      288
Met Cys Tyr Ser Val Ala Asn His Asn Ser Phe Leu Asn Leu Lys Asn
85      90      95
aaa tgg att agt gag atc agg agc aac cta ccc tgt acc ccg gtg ctg      336
Lys Trp Ile Ser Glu Ile Arg Ser Asn Leu Pro Cys Thr Pro Val Leu
100     105     110

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gtt	gtg	gcc	aca	cag	acg	gac	cag	aga	gag	gtg	gga	cct	cac	agg	gct	384
Val	Val	Ala	Thr	Gln	Thr	Asp	Gln	Arg	Glu	Val	Gly	Pro	His	Arg	Ala	
		115					120					125				
tcc	tgc	atc	aat	gcc	ata	gaa	ggg	aag	aga	ctt	gcc	cag	gat	gtg	aga	432
Ser	Cys	Ile	Asn	Ala	Ile	Glu	Gly	Lys	Arg	Leu	Ala	Gln	Asp	Val	Arg	
		130				135					140					
gcc	aag	ggc	tac	ctg	gag	tgc	tca	gcc	ctc	agc	aac	cgg	gga	gta	cag	480
Ala	Lys	Gly	Tyr	Leu	Glu	Cys	Ser	Ala	Leu	Ser	Asn	Arg	Gly	Val	Gln	
		145			150				155					160		
cag	gta	ttt	gaa	tgt	gct	gtc	cga	aca	gct	gtc	aac	cag	gcc	agg	agg	528
Gln	Val	Phe	Glu	Cys	Ala	Val	Arg	Thr	Ala	Val	Asn	Gln	Ala	Arg	Arg	
			165				170							175		
cga	aac	aga	agg	aag	ctg	ttc	tcc	atc	aat	gaa	tgc	aag	atc	ttc		573
Arg	Asn	Arg	Arg	Lys	Leu	Phe	Ser	Ile	Asn	Glu	Cys	Lys	Ile	Phe		
			180				185						190			
taa																576

<210> 264
 <211> 191
 <212> PRT
 <213> Mus musculus

<400> 264
 Met Leu Ser Ser Ile Lys Cys Val Leu Val Gly Asp Ser Ala Val Gly
 1 5 10 15
 Lys Thr Ser Leu Leu Val Arg Phe Thr Ser Glu Thr Phe Pro Glu Ala
 20 25 30
 Tyr Lys Pro Thr Val Tyr Glu Asn Thr Gly Val Asp Val Phe Met Asp
 35 40 45
 Gly Ile Gln Ile Ser Leu Gly Leu Trp Asp Thr Ala Gly Asn Asp Ala
 50 55 60
 Phe Arg Ser Ile Arg Pro Leu Ser Tyr Gln Gln Ala Asp Val Val Leu
 65 70 75 80
 Met Cys Tyr Ser Val Ala Asn His Asn Ser Phe Leu Asn Leu Lys Asn
 85 90 95
 Lys Trp Ile Ser Glu Ile Arg Ser Asn Leu Pro Cys Thr Pro Val Leu
 100 105 110
 Val Val Ala Thr Gln Thr Asp Gln Arg Glu Val Gly Pro His Arg Ala
 115 120 125
 Ser Cys Ile Asn Ala Ile Glu Gly Lys Arg Leu Ala Gln Asp Val Arg
 130 135 140
 Ala Lys Gly Tyr Leu Glu Cys Ser Ala Leu Ser Asn Arg Gly Val Gln
 145 150 155 160
 Gln Val Phe Glu Cys Ala Val Arg Thr Ala Val Asn Gln Ala Arg Arg
 165 170 175
 Arg Asn Arg Arg Lys Leu Phe Ser Ile Asn Glu Cys Lys Ile Phe
 180 185 190

<210> 265
 <211> 786
 <212> DNA
 <213> Mus musculus

<220>
 <221> CDS
 <222> (1) .. (786)

atg	gcc	ccg	cag	caa	ggc	cgg	ccg	gcg	ctg	ccc	gcc	cgc	tgc	gag	ccg	48
Met	Ala	Pro	Gln	Gln	Gly	Arg	Pro	Ala	Leu	Pro	Ala	Arg	Cys	Glu	Pro	
1			5						10					15		
ccg	gcg	gcg	ccg	ccg	gta	ccg	cct	cgc	cga	gag	cgc	ggg	ggg	cgc	ggg	96
Pro	Ala	Ala	Pro	Pro	Val	Pro	Pro	Arg	Glu	Arg	Gly	Gly	Arg	Gly		
			20				25					30				
gcg	cgc	ggg	ccc	ggg	gtg	tcc	ggg	ggt	cgg	ggg	cgc	gcg	ggc	ggc	gcc	144

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Ala	Arg	Gly	Pro	Gly	Val	Ser	Gly	Gly	Arg	Gly	Arg	Ala	Gly	Gly	Ala		
		35					40					45					
gag	gga	cgc	ggc	gtc	aag	tgc	gtg	ctg	gtc	ggc	gac	ggc	gcg	gtg	ggc		192
Glu	Gly	Arg	Gly	Val	Lys	Cys	Val	Leu	Val	Gly	Asp	Gly	Ala	Val	Gly		
		50				55				60							
aag	acc	agc	ctg	gtg	gtc	agc	tac	acc	act	aac	ggc	tac	ccc	acc	gag		240
Lys	Thr	Ser	Leu	Val	Val	Ser	Tyr	Thr	Thr	Asn	Gly	Tyr	Pro	Thr	Glu		
		65			70				75					80			
tac	atc	cct	acg	gcc	ttc	gac	aac	ttc	tcg	gcc	gtg	gtg	tct	gta	gat		288
Tyr	Ile	Pro	Thr	Ala	Phe	Asp	Asn	Phe	Ser	Ala	Val	Val	Ser	Val	Asp		
				85				90					95				
ggg	cgg	cct	gtg	aga	ctc	cag	ctc	tgt	gac	act	gca	gga	cag	gat	gag		336
Gly	Arg	Pro	Val	Arg	Leu	Gln	Leu	Cys	Asp	Thr	Ala	Gly	Gln	Asp	Glu		
			100					105					110				
ttt	gac	aag	ctg	agg	ccc	ctc	tgc	tac	acc	aac	aca	gac	atc	ttc	ctg		384
Phe	Asp	Lys	Leu	Arg	Pro	Leu	Cys	Tyr	Thr	Asn	Thr	Asp	Ile	Phe	Leu		
		115				120				125							
ctg	tgc	ttc	agc	gtg	gtg	agc	ccc	aca	tcc	ttc	cag	aac	gtg	ggc	gag		432
Leu	Cys	Phe	Ser	Val	Val	Ser	Pro	Thr	Ser	Phe	Gln	Asn	Val	Gly	Glu		
		130			135					140							
aag	tgg	gtt	cca	gag	att	cga	cgt	cac	tgc	cca	aag	gcc	ccc	atc	atc		480
Lys	Trp	Val	Pro	Glu	Ile	Arg	Arg	His	Cys	Pro	Lys	Ala	Pro	Ile	Ile		
		145			150			155						160			
ctg	gtc	ggg	aca	cag	tcg	gac	ctc	agg	gag	gac	gtc	aaa	gtg	ctc	ata		528
Leu	Val	Gly	Thr	Gln	Ser	Asp	Leu	Arg	Glu	Asp	Val	Lys	Val	Leu	Ile		
			165					170						175			
gaa	ctg	gac	aag	tgc	aaa	gag	aag	ccg	gtg	cct	gaa	gag	gcg	gcg	aag		576
Glu	Leu	Asp	Lys	Cys	Lys	Glu	Lys	Pro	Val	Pro	Glu	Glu	Ala	Ala	Lys		
		180						185					190				
ctg	tgc	gcg	gag	gaa	gtc	aaa	gct	gtc	tcc	tac	atc	gag	tgc	tca	gcg		624
Leu	Cys	Ala	Glu	Glu	Val	Lys	Ala	Val	Ser	Tyr	Ile	Glu	Cys	Ser	Ala		
		195				200						205					
ttg	act	cag	aaa	aac	ctc	aaa	gag	gtt	ttc	gac	gcc	gcc	att	gtt	gct		672
Leu	Thr	Gln	Lys	Asn	Leu	Lys	Glu	Val	Phe	Asp	Ala	Ala	Ile	Val	Ala		
		210				215				220							
ggt	atc	cag	cac	tca	gac	tcc	cag	cta	cag	cca	aag	aag	tct	aaa	agc		720
Gly	Ile	Gln	His	Ser	Asp	Ser	Gln	Leu	Gln	Pro	Lys	Lys	Ser	Lys	Ser		
		225			230				235					240			
agg	acc	ccg	gat	aag	gtg	cgg	gac	ctg	tcc	aag	tct	tgg	tgg	agg	aag		768
Arg	Thr	Pro	Asp	Lys	Val	Arg	Asp	Leu	Ser	Lys	Ser	Trp	Trp	Arg	Lys		
			245					250						255			
tat	tgc	tgc	ctg	gcc	tga												786
Tyr	Cys	Cys	Leu	Ala													
			260														

<210> 266

<211> 261

<212> PRT

<213> Mus musculus

<400> 266

Met	Ala	Pro	Gln	Gln	Gly	Arg	Pro	Ala	Leu	Pro	Ala	Arg	Cys	Glu	Pro		
1			5						10					15			
Pro	Ala	Ala	Pro	Pro	Val	Pro	Pro	Arg	Arg	Glu	Arg	Gly	Gly	Arg	Gly		
			20					25					30				
Ala	Arg	Gly	Pro	Gly	Val	Ser	Gly	Gly	Arg	Gly	Arg	Ala	Gly	Gly	Ala		
		35				40						45					
Glu	Gly	Arg	Gly	Val	Lys	Cys	Val	Leu	Val	Gly	Asp	Gly	Ala	Val	Gly		
		50			55					60							
Lys	Thr	Ser	Leu	Val	Val	Ser	Tyr	Thr	Thr	Asn	Gly	Tyr	Pro	Thr	Glu		
		65			70				75					80			
Tyr	Ile	Pro	Thr	Ala	Phe	Asp	Asn	Phe	Ser	Ala	Val	Val	Ser	Val	Asp		
			85					90					95				
Gly	Arg	Pro	Val	Arg	Leu	Gln	Leu	Cys	Asp	Thr	Ala	Gly	Gln	Asp	Glu		
			100					105					110				
Phe	Asp	Lys	Leu	Arg	Pro	Leu	Cys	Tyr	Thr	Asn	Thr	Asp	Ile	Phe	Leu		
		115						120					125				

200/291

Leu Cys Phe Ser Val Val Ser Pro Thr Ser Phe Gln Asn Val Gly Glu
 130 135 140
 Lys Trp Val Pro Glu Ile Arg Arg His Cys Pro Lys Ala Pro Ile Ile
 145 150 155 160
 Leu Val Gly Thr Gln Ser Asp Leu Arg Glu Asp Val Lys Val Leu Ile
 165 170 175
 Glu Leu Asp Lys Cys Lys Glu Lys Pro Val Pro Glu Glu Ala Ala Lys
 180 185 190
 Leu Cys Ala Glu Glu Val Lys Ala Val Ser Tyr Ile Glu Cys Ser Ala
 195 200 205
 Leu Thr Gln Lys Asn Leu Lys Glu Val Phe Asp Ala Ala Ile Val Ala
 210 215 220
 Gly Ile Gln His Ser Asp Ser Gln Leu Gln Pro Lys Lys Ser Lys Ser
 225 230 235 240
 Arg Thr Pro Asp Lys Val Arg Asp Leu Ser Lys Ser Trp Trp Arg Lys
 245 250 255
 Tyr Cys Cys Leu Ala
 260

<210> 267

<211> 624

<212> DNA

<213> Trichoderma reesei

<220>

<221> CDS

<222> (1)..(624)

<400> 267

atg cct ctc tgc ggc ggc tcc aag acg gtg cag cgc aag ctg gtt ctt	48
Met Pro Leu Cys Gly Gly Ser Lys Thr Val Gln Arg Lys Leu Val Leu	
1 5 10 15	
ctg ggc gat ggt gcc agc gga aag acg tcg ctg ctc aac gtc ttc aca	96
Leu Gly Asp Gly Ala Ser Gly Lys Thr Ser Leu Leu Asn Val Phe Thr	
20 25 30	
aga ggt tac ttt ccc acc gtc tac gaa cct acc gtc ttt gaa aat tac	144
Arg Gly Tyr Phe Pro Thr Val Tyr Glu Pro Thr Val Phe Glu Asn Tyr	
35 40 45	
gtc cac gac atc ttt gtc gac aac gtc cac atc gag ctc tcc ctc tgg	192
Val His Asp Ile Phe Val Asp Asn Val His Ile Glu Leu Ser Leu Trp	
50 55 60	
gat acg gcg gga cag gag gaa ttc gat cgg ctg cga tcg ctc tcc tac	240
Asp Thr Ala Gly Gln Glu Phe Asp Arg Leu Arg Ser Leu Ser Tyr	
65 70 75 80	
gat gac acc gat ttg atc gtg ctc tgt tac tcg gtc gat agc aaa gac	288
Asp Asp Thr Asp Leu Ile Val Leu Cys Tyr Ser Val Asp Ser Lys Asp	
85 90 95	
tcg cta gaa aac gtc gaa tcc aaa tgg gtc gga gag att gcc gac aac	336
Ser Leu Glu Asn Val Glu Ser Lys Trp Val Gly Glu Ile Ala Asp Asn	
100 105 110	
tgc ccc ggc gtc aag ctg gtc ctc gtc gcc ctc aag tgc gac ctg cgc	384
Cys Pro Gly Val Lys Leu Val Leu Val Ala Leu Lys Cys Asp Leu Arg	
115 120 125	
cag caa gag gac gac gag ccc gag gac cag gca gcg gcc gac ggc aac	432
Gln Gln Glu Asp Asp Glu Pro Glu Asp Gln Ala Ala Ala Asp Gly Asn	
130 135 140	
gca cag cgc gag aaa ccg ccc acg att tcc tac gac gag ggc ctt gag	480
Ala Gln Arg Glu Lys Pro Thr Ile Ser Tyr Asp Glu Gly Leu Glu	
145 150 155 160	
gtc gcc aag cgg ata ggc gcc tcg cgc tac ctg gag tgc tcg gcg atg	528
Val Ala Lys Arg Ile Gly Ala Ser Arg Tyr Leu Glu Cys Ser Ala Met	
165 170 175	
aag aac cgc ggc gtc aac gag gcc ttt acc gag gcg gcc cgc gta gcg	576
Lys Asn Arg Gly Val Asn Glu Ala Phe Thr Glu Ala Ala Arg Val Ala	
180 185 190	
cta agc gtc aag aag gag agg gaa gac aac aag tgc aca atc atg	621
Leu Ser Val Lys Lys Glu Arg Glu Asp Asn Lys Cys Thr Ile Met	
195 200 205	

taa

624

<210> 268

<211> 207

<212> PRT

<213> Trichoderma reesei

<400> 268

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Met Pro Leu Cys Gly Gly Ser Lys Thr Val Gln Arg Lys Leu Val Leu
1      5      10      15
Leu Gly Asp Gly Ala Ser Gly Lys Thr Ser Leu Leu Asn Val Phe Thr
20      25      30
Arg Gly Tyr Phe Pro Thr Val Tyr Glu Pro Thr Val Phe Glu Asn Tyr
35      40      45
Val His Asp Ile Phe Val Asp Asn Val His Ile Glu Ser Leu Trp
50      55      60
Asp Thr Ala Gly Gln Glu Glu Phe Asp Arg Leu Arg Ser Leu Ser Tyr
65      70      75      80
Asp Asp Thr Asp Leu Ile Val Leu Cys Tyr Ser Val Asp Ser Lys Asp
85      90      95
Ser Leu Glu Asn Val Glu Ser Lys Trp Val Gly Glu Ile Ala Asp Asn
100     105     110
Cys Pro Gly Val Lys Leu Val Leu Val Ala Leu Lys Cys Asp Leu Arg
115     120     125
Gln Gln Glu Asp Asp Glu Pro Glu Asp Gln Ala Ala Asp Gly Asn
130     135     140
Ala Gln Arg Glu Lys Pro Pro Thr Ile Ser Tyr Asp Glu Gly Leu Glu
145     150     155     160
Val Ala Lys Arg Ile Gly Ala Ser Arg Tyr Leu Glu Cys Ser Ala Met
165     170     175
Lys Asn Arg Gly Val Asn Glu Ala Phe Thr Glu Ala Ala Arg Val Ala
180     185     190
Leu Ser Val Lys Lys Glu Arg Glu Asp Asn Lys Cys Thr Ile Met
195     200     205

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<210> 269

<211> 675

<212> DNA

<213> Ashbya gossypii

<220>

<221> CDS

<222> (1) .. (675)

<400> 269

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atg cct ctg tgt ggg tcg agc tcg tcg tcg aag cat cct atc gag cgc      48
Met Pro Leu Cys Gly Ser Ser Ser Ser Ser Lys His Pro Ile Glu Arg
1      5      10      15
aag atc gtc atc ctc gga gac ggt gct tgc ggg aag acg tcg ctg ttg      96
Lys Ile Val Ile Leu Gly Asp Gly Ala Cys Gly Lys Thr Ser Leu Leu
20      25      30
aac gtg ttc acg cga ggg tac ttt ccg aag gtg tac gag ccc acg gta      144
Asn Val Phe Thr Arg Gly Tyr Phe Pro Lys Val Tyr Glu Pro Thr Val
35      40      45
ttc gaa aac tac atc cat gac atc ttc gtg gac aac cag cac atc acg      192
Phe Glu Asn Tyr Ile His Asp Ile Phe Val Asp Asn Gln His Ile Thr
50      55      60
ctg agc ctg tgg gac act gct ggg cag gag gag ttt gac cgg ttg cga      240
Leu Ser Leu Trp Asp Thr Ala Gly Gln Glu Glu Phe Asp Arg Leu Arg
65      70      75      80
tcg ctg tcg tac tcg gac aca cac acg att atg ctg tgt ttc tcg gtg      288
Ser Leu Ser Tyr Ser Asp Thr His Thr Ile Met Leu Cys Phe Ser Val
85      90      95
gac tcg cgg gac tcg ctg gag aac gtc aag aac aag tgg gtg agc gaa      336
Asp Ser Arg Asp Ser Leu Glu Asn Val Lys Asn Lys Trp Val Ser Glu

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202/291

100	105	110	
att gcg gac cac tgc gag ggc gtg aag ctg gtg cta gtg gcg ctg aag			384
Ile Ala Asp His Cys Glu Gly Val Lys Leu Val Leu Val Ala Leu Lys			
115	120	125	
tgc gac ttg cgc agc agc gac gag tac ggc aac gag agc gcc atc acg			432
Cys Asp Leu Arg Ser Ser Asp Glu Tyr Gly Asn Glu Ser Ala Ile Thr			
130	135	140	
ccg ggg tcc atc cag aac cag aag tac aac ggc ggc ggc ggc aac ggg			480
Pro Gly Ser Ile Gln Asn Gln Lys Tyr Asn Gly Gly Gly Gly Asn Gly			
145	150	155	160
ctg atc ccc tac gac gag ggg ctg gcg atg gcc aag cag att ggg gcg			528
Leu Ile Pro Tyr Asp Glu Gly Leu Ala Met Ala Lys Gln Ile Gly Ala			
165	170	175	
ctg cgc tat ctg gag tgc agc gcc aag atg aac cgt ggc gtg aac gag			576
Leu Arg Tyr Leu Glu Cys Ser Ala Lys Met Asn Arg Gly Val Asn Glu			
180	185	190	
gcg ttc acc gag gct gcg cgc tgc gcg ctg act gcg aca ccg aag ggg			624
Ala Phe Thr Glu Ala Ala Arg Cys Ala Leu Thr Ala Thr Pro Lys Gly			
195	200	205	
gcc cgg gac tct gcg ccc gag gcc gaa agc agc agt tgt act atc atg			672
Ala Arg Asp Ser Ala Pro Glu Ala Glu Ser Ser Ser Cys Thr Ile Met			
210	215	220	
tga			675

<210> 270

<211> 224

<212> PRT

<213> Ashbya gossypii

<400> 270

Met Pro Leu Cys Gly Ser Ser Ser Ser Ser Lys His Pro Ile Glu Arg	
1 5 10 15	
Lys Ile Val Ile Leu Gly Asp Gly Ala Cys Gly Lys Thr Ser Leu Leu	
20 25 30	
Asn Val Phe Thr Arg Gly Tyr Phe Pro Lys Val Tyr Glu Pro Thr Val	
35 40 45	
Phe Glu Asn Tyr Ile His Asp Ile Phe Val Asp Asn Gln His Ile Thr	
50 55 60	
Leu Ser Leu Trp Asp Thr Ala Gly Gln Glu Glu Phe Asp Arg Leu Arg	
65 70 75 80	
Ser Leu Ser Tyr Ser Asp Thr His Thr Ile Met Leu Cys Phe Ser Val	
85 90 95	
Asp Ser Arg Asp Ser Leu Glu Asn Val Lys Asn Lys Trp Val Ser Glu	
100 105 110	
Ile Ala Asp His Cys Glu Gly Val Lys Leu Val Leu Val Ala Leu Lys	
115 120 125	
Cys Asp Leu Arg Ser Ser Asp Glu Tyr Gly Asn Glu Ser Ala Ile Thr	
130 135 140	
Pro Gly Ser Ile Gln Asn Gln Lys Tyr Asn Gly Gly Gly Asn Gly	
145 150 155 160	
Leu Ile Pro Tyr Asp Glu Gly Leu Ala Met Ala Lys Gln Ile Gly Ala	
165 170 175	
Leu Arg Tyr Leu Glu Cys Ser Ala Lys Met Asn Arg Gly Val Asn Glu	
180 185 190	
Ala Phe Thr Glu Ala Ala Arg Cys Ala Leu Thr Ala Thr Pro Lys Gly	
195 200 205	
Ala Arg Asp Ser Ala Pro Glu Ala Glu Ser Ser Ser Cys Thr Ile Met	
210 215 220	

<210> 271

<211> 624

<212> DNA

<213> Ashbya gossypii

<220>

<221> CDS

<222> (1)..(624)

<400> 271

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atg tct cag caa atg cat aac ccc agt atc agg aga aaa ttg gtg atc      48
Met Ser Gln Gln Met His Asn Pro Ser Ile Arg Arg Lys Leu Val Ile
1      5      10      15
gtc gga gat ggt gca tgc ggg aaa aca tgt ctt ttg att gtg ttt gcc      96
Val Gly Asp Gly Ala Cys Gly Lys Thr Cys Leu Leu Ile Val Phe Ala
20      25      30
aag gga aag ttc cca cag gtg tat gtt cct acg gtt ttc gac aac tac      144
Lys Gly Lys Phe Pro Gln Val Tyr Val Pro Thr Val Phe Asp Asn Tyr
35      40      45
gtt gca gat gtg gag gta gac ggc aga cgg gtg gag ctt gcg ctt tgg      192
Val Ala Asp Val Glu Val Asp Gly Arg Arg Val Glu Leu Ala Leu Trp
50      55      60
gat acg gct ggg cag gag gat tac gac agg cta cgg ccg tta tcg tac      240
Asp Thr Ala Gly Gln Glu Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr
65      70      75      80
cca gac tcc aat gtt gtg ttg atc tgc tac tcg att gac cta cca gac      288
Pro Asp Ser Asn Val Val Leu Ile Cys Tyr Ser Ile Asp Leu Pro Asp
85      90      95
tcg ttg gag aac gtg atg gag aag tgg atc agc gag gtg cta tac ttc      336
Ser Leu Glu Asn Val Met Glu Lys Trp Ile Ser Glu Val Leu Tyr Phe
100      105      110
tgc cag ggt gtt ccg atc atc ttg gtg ggg tgc aag gct gac ttg cgg      384
Cys Gln Gly Val Pro Ile Ile Leu Val Gly Cys Lys Ala Asp Leu Arg
115      120      125
aac gat ccg caa gtg atc gag cag ttg aga cag cag gga cag cag cct      432
Asn Asp Pro Gln Val Ile Glu Gln Leu Arg Gln Gln Gly Gln Gln Pro
130      135      140
gtc tcg cag gct cag gcg cag gag gta gcg gac cag atc ggc gcg gta      480
Val Ser Gln Ala Gln Ala Gln Glu Val Ala Asp Gln Ile Gly Ala Val
145      150      155      160
gag tac att gag tgc tct gca aag acc ggc ttt ggt gtg cgc gag gtg      528
Glu Tyr Ile Glu Cys Ser Ala Lys Thr Gly Phe Gly Val Arg Glu Val
165      170      175
ttt gag gcg gcc acg cgt gct tcc ttg atg ggg aaa caa ggc aag tct      576
Phe Glu Ala Ala Thr Arg Ala Ser Leu Met Gly Lys Gln Gly Lys Ser
180      185      190
aag gcg aag tct gac aag aag aag aag aaa aag tgt gtg gtc ttg      621
Lys Ala Lys Ser Asp Lys Lys Lys Lys Lys Lys Cys Val Val Leu
195      200      205
tag                                                                 624

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<210> 272

<211> 207

<212> PRT

<213> Ashbya gossypii

<400> 272

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Met Ser Gln Gln Met His Asn Pro Ser Ile Arg Arg Lys Leu Val Ile
1      5      10      15
Val Gly Asp Gly Ala Cys Gly Lys Thr Cys Leu Leu Ile Val Phe Ala
20      25      30
Lys Gly Lys Phe Pro Gln Val Tyr Val Pro Thr Val Phe Asp Asn Tyr
35      40      45
Val Ala Asp Val Glu Val Asp Gly Arg Arg Val Glu Leu Ala Leu Trp
50      55      60
Asp Thr Ala Gly Gln Glu Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr
65      70      75      80
Pro Asp Ser Asn Val Val Leu Ile Cys Tyr Ser Ile Asp Leu Pro Asp
85      90      95
Ser Leu Glu Asn Val Met Glu Lys Trp Ile Ser Glu Val Leu Tyr Phe
100      105      110

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204/291

Cys Gln Gly Val Pro Ile Ile Leu Val Gly Cys Lys Ala Asp Leu Arg
 115 120 125
 Asn Asp Pro Gln Val Ile Glu Gln Leu Arg Gln Gln Gly Gln Gln Pro
 130 135 140
 Val Ser Gln Ala Gln Ala Gln Glu Val Ala Asp Gln Ile Gly Ala Val
 145 150 155 160
 Glu Tyr Ile Glu Cys Ser Ala Lys Thr Gly Phe Gly Val Arg Glu Val
 165 170 175
 Phe Glu Ala Ala Thr Arg Ala Ser Leu Met Gly Lys Gln Gly Lys Ser
 180 185 190
 Lys Ala Lys Ser Asp Lys Lys Lys Lys Lys Cys Val Val Leu
 195 200 205

<210> 273

<211> 615

<212> DNA

<213> Yarrowia lipolytica

<220>

<221> CDS

<222> (1)..(615)

<400> 273

atg ccc caa cca acg gat ctg cga aga aaa ctc gtc att gtc ggc gac	48
Met Pro Gln Pro Thr Asp Leu Arg Arg Lys Leu Val Ile Val Gly Asp	
1 5 10 15	
gga gcc tgc ggc aag acc tgt ctg ctg att gtc ttc gcg aag ggc acc	96
Gly Ala Cys Gly Lys Thr Cys Leu Leu Ile Val Phe Ala Lys Gly Thr	
20 25 30	
ttc ccg gag gtg tac gtg ccc acc gtg ttt gag aac tac gtg gcc gac	144
Phe Pro Glu Val Tyr Val Pro Thr Val Phe Glu Asn Tyr Val Ala Asp	
35 40 45	
gtg gag att gac ggc cga cga gtg gag ctg gcc ctg tgg gat acc gcc	192
Val Glu Ile Asp Gly Arg Arg Val Glu Leu Ala Leu Trp Asp Thr Ala	
50 55 60	
ggc cag gag gat tac gac cga ctg cga ccc ctg tcc tac ccc gac gcc	240
Gly Gln Glu Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Asp Ala	
65 70 75 80	
aac gtc atc atc atc tgc ttc gcc atc gac agc ccc gac tcg ctc gac	288
Asn Val Ile Ile Ile Cys Phe Ala Ile Asp Ser Pro Asp Ser Leu Asp	
85 90 95	
aac gtg cag gag aag tgg atc tcc gag gtg ctg cac ttt tgc cag ggc	336
Asn Val Gln Glu Lys Trp Ile Ser Glu Val Leu His Phe Cys Gln Gly	
100 105 110	
gtg cct att ctg ctg gtc ggt tgc aag gtc gac ctg cga aac gac ccc	384
Val Pro Ile Leu Leu Val Gly Cys Lys Val Asp Leu Arg Asn Asp Pro	
115 120 125	
aag acc atc gag gag ctg aga aga acg tcc cag cga ccc gtc acg acc	432
Lys Thr Ile Glu Glu Leu Arg Arg Thr Ser Gln Arg Pro Val Thr Thr	
130 135 140	
gag gag gga aat gcc gtg gcc cag aag att ggc gcc ggc aag tac ctg	480
Glu Glu Gly Asn Ala Val Ala Gln Lys Ile Gly Ala Gly Lys Tyr Leu	
145 150 155 160	
gag tgc tct gcc cga acc cac gac gga gtg aga gag gtc ttc gag cat	528
Glu Cys Ser Ala Arg Thr His Asp Gly Val Arg Glu Val Phe Glu His	
165 170 175	
gcc acc cga gct gcc ctg act gcc cac ggc cag aag ggc tcc aag agc	576
Ala Thr Arg Ala Ala Leu Thr Ala His Gly Gln Lys Gly Ser Lys Ser	
180 185 190	
tcc agc aga gag ggc aag aaa aag tgt ttg att ttg taa	615
Ser Ser Arg Glu Gly Lys Lys Lys Cys Leu Ile Leu	
195 200	

<210> 274

<211> 204

<212> PRT

<213> Yarrowia lipolytica

<400> 274

Met Pro Gln Pro Thr Asp Leu Arg Arg Lys Leu Val Ile Val Gly Asp
 1 5 10 15
 Gly Ala Cys Gly Lys Thr Cys Leu Leu Ile Val Phe Ala Lys Gly Thr
 20 25 30
 Phe Pro Glu Val Tyr Val Pro Thr Val Phe Glu Asn Tyr Val Ala Asp
 35 40 45
 Val Glu Ile Asp Gly Arg Arg Val Glu Leu Ala Leu Trp Asp Thr Ala
 50 55 60
 Gly Gln Glu Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Asp Ala
 65 70 75 80
 Asn Val Ile Ile Ile Cys Phe Ala Ile Asp Ser Pro Asp Ser Leu Asp
 85 90 95
 Asn Val Gln Glu Lys Trp Ile Ser Glu Val Leu His Phe Cys Gln Gly
 100 105 110
 Val Pro Ile Leu Leu Val Gly Cys Lys Val Asp Leu Arg Asn Asp Pro
 115 120 125
 Lys Thr Ile Glu Glu Leu Arg Arg Thr Ser Gln Arg Pro Val Thr Thr
 130 135 140
 Glu Glu Gly Asn Ala Val Ala Gln Lys Ile Gly Ala Gly Lys Tyr Leu
 145 150 155 160
 Glu Cys Ser Ala Arg Thr His Asp Gly Val Arg Glu Val Phe Glu His
 165 170 175
 Ala Thr Arg Ala Ala Leu Thr Ala His Gly Gln Lys Gly Ser Lys Ser
 180 185 190
 Ser Ser Arg Glu Gly Lys Lys Lys Cys Leu Ile Leu
 195 200

<210> 275

<211> 915

<212> DNA

<213> Zea mays

<220>

<221> CDS

<222> (10)..(657)

<400> 275

gtcttggtcc atg gcc tcc agc gcc tcc cgg ttc atc aag tgc gtc aca gtg 51
 Met Ala Ser Ser Ala Ser Arg Phe Ile Lys Cys Val Thr Val
 1 5 10
 ggg gac ggc gcc gtg gga aag acc tgc atg ctc atc tgc tac acc agc 99
 Gly Asp Gly Ala Val Gly Lys Thr Cys Met Leu Ile Cys Tyr Thr Ser
 15 20 25 30
 aac aag ttc ccc act gat tac ata ccc act gtc ttc gat aac ttc agt 147
 Asn Lys Phe Pro Thr Asp Tyr Ile Pro Thr Val Phe Asp Asn Phe Ser
 35 40 45
 gca aac gtg gta gtc gac ggt acc acg gtg aat ttg ggc ctt tgg gat 195
 Ala Asn Val Val Val Asp Gly Thr Thr Val Asn Leu Gly Leu Trp Asp
 50 55 60
 act gca ggg cag gaa gat tac aac aga ctg agg cca ctg agc tac cgc 243
 Thr Ala Gly Gln Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg
 65 70 75
 gga gca gat gtg ttc gtg ctc gcc ttc tgc ctt gtc agc cga gct agc 291
 Gly Ala Asp Val Phe Val Leu Ala Phe Ser Leu Val Ser Arg Ala Ser
 80 85 90
 tac gag aat gtt atg aag aag tgg cta ccg gag ctt cag cat tat gca 339
 Tyr Glu Asn Val Met Lys Lys Trp Leu Pro Glu Leu Gln His Tyr Ala
 95 100 105 110
 ccg ggt gtc ccc ata gtg ttg gcc gga act aaa ttg gat ctt cgt gaa 387
 Pro Gly Val Pro Ile Val Leu Ala Gly Thr Lys Leu Asp Leu Arg Glu
 115 120 125
 gac agg cac tac tta gtt gac cat cct ggt gcg gta cct gtt act aca 435
 Asp Arg His Tyr Leu Val Asp His Pro Gly Ala Val Pro Val Thr Thr
 130 135 140
 gca cag ggg gag gaa ctg cgc aag cac att ggc gca act tgc tac atc 483
 Ala Gln Gly Glu Glu Leu Arg Lys His Ile Gly Ala Thr Cys Tyr Ile

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      145              150              155
gaa tgc agc tca aaa act cag cag aat gtg aaa gct gtg ttt gat gct      531
Glu Cys Ser Ser Lys Thr Gln Gln Asn Val Lys Ala Val Phe Asp Ala
      160              165              170
gcc atc aag gta gta atc agg cct ccg acg aag cag cga gaa agg aag      579
Ala Ile Lys Val Val Ile Arg Pro Pro Thr Lys Gln Arg Glu Arg Lys
      175              180              185              190
aaa aag aaa gaa cgg cga gga tgc tca ata ttc tgc agc cgt atc atg      627
Lys Lys Lys Glu Arg Arg Gly Cys Ser Ile Phe Cys Ser Arg Ile Met
      195              200              205
cac gca aga aga cta gga tgc ttc aag tgatagaagg ccttcttcga      674
His Ala Arg Arg Leu Gly Cys Phe Lys
      210              215
cgataacgta ggcttctaag atgaatcgag atcgtgtata gtttgtctcc atgttccaaa      734

gtgctcgttg cgcttgtgca cttgggctgg taatgtgtat atttagtctt tgccaattga      794

tatttaggag aaatattaag cacttcgttt atgtaccatt ggctcataat gagctgggaa      854

gtccaataca tactaagaag taacaatatt ttcttcgat gattttatta tggtttctcg      914

t                                                                 915

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<210> 276

<211> 215

<212> PRT

<213> Zea mays

<400> 276

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Met Ala Ser Ser Ala Ser Arg Phe Ile Lys Cys Val Thr Val Gly Asp
1              5              10              15
Gly Ala Val Gly Lys Thr Cys Met Leu Ile Cys Tyr Thr Ser Asn Lys
      20              25              30
Phe Pro Thr Asp Tyr Ile Pro Thr Val Phe Asp Asn Phe Ser Ala Asn
      35              40              45
Val Val Val Asp Gly Thr Thr Val Asn Leu Gly Leu Trp Asp Thr Ala
      50              55              60
Gly Gln Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala
      65              70              75              80
Asp Val Phe Val Leu Ala Phe Ser Leu Val Ser Arg Ala Ser Tyr Glu
      85              90              95
Asn Val Met Lys Lys Trp Leu Pro Glu Leu Gln His Tyr Ala Pro Gly
      100              105              110
Val Pro Ile Val Leu Ala Gly Thr Lys Leu Asp Leu Arg Glu Asp Arg
      115              120              125
His Tyr Leu Val Asp His Pro Gly Ala Val Pro Val Thr Thr Ala Gln
      130              135              140
Gly Glu Glu Leu Arg Lys His Ile Gly Ala Thr Cys Tyr Ile Glu Cys
      145              150              155              160
Ser Ser Lys Thr Gln Asn Val Lys Ala Val Phe Asp Ala Ala Ile
      165              170              175
Lys Val Val Ile Arg Pro Pro Thr Lys Gln Arg Glu Arg Lys Lys Lys
      180              185              190
Lys Glu Arg Arg Gly Cys Ser Ile Phe Cys Ser Arg Ile Met His Ala
      195              200              205
Arg Arg Leu Gly Cys Phe Lys
      210              215

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<210> 277

<211> 1002

<212> DNA

<213> Zea mays

<220>

<221> CDS

<222> (149)..(787)

<400> 277

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cttggtttgc tgcttgccct cggagcagtg cttccgccg ccgccgccgc cgcctgttgt      120

gagaaggaga ggccgggggt gggaggag atg agc gtg acc aag ttc atc aag      172
                        Met Ser Val Thr Lys Phe Ile Lys
                        1           5
tgc gtc acg gtg ggg gac ggc gcg gtg ggc aag acc tgc atg ctc atc      220
Cys Val Thr Val Gly Asp Gly Ala Val Gly Lys Thr Cys Met Leu Ile
10           15           20
tgc tac acc agc aac aag ttc ccc acg gat tac atc ccc acg gtg ttc      268
Cys Tyr Thr Ser Asn Lys Phe Pro Thr Asp Tyr Ile Pro Thr Val Phe
25           30           35           40
gac aac ttc agc gcc aac gtc tcc gtg gac ggc agc atc gtc aac ctg      316
Asp Asn Phe Ser Ala Asn Val Ser Val Asp Gly Ser Ile Val Asn Leu
45           50           55
ggc ctc tgg gac act gca gga caa gag gac tac agc aga ttg cgg cca      364
Gly Leu Trp Asp Thr Ala Gly Gln Glu Asp Tyr Ser Arg Leu Arg Pro
60           65           70
ctg agc tac agg ggc gcg gac gtg ttc gtg ctg gcc ttc tcc ttg atc      412
Leu Ser Tyr Arg Gly Ala Asp Val Phe Val Leu Ala Phe Ser Leu Ile
75           80           85
agc agg gcg agc tat gag aac gtc ctt aag aag tgg gtg cca gag ctt      460
Ser Arg Ala Ser Tyr Glu Asn Val Leu Lys Lys Trp Val Pro Glu Leu
90           95           100
cgc aga ttc gcg ccc gac gtc ccg gtc gtt ctt gtc ggg acc aag tta      508
Arg Arg Phe Ala Pro Asp Val Pro Val Val Leu Val Gly Thr Lys Leu
105          110          115          120
gat ctc cgt gac cac agg gcc tac ctt gct gac cat cct gga gcg tcg      556
Asp Leu Arg Asp His Arg Ala Tyr Leu Ala Asp His Pro Gly Ala Ser
125          130          135
acg atc acg acg gca cag ggc gaa gaa ctg agg agg cag atc ggc gct      604
Thr Ile Thr Thr Ala Gln Gly Glu Glu Leu Arg Arg Gln Ile Gly Ala
140          145          150
gcg gct tac atc gag tgc agt tcc aaa acg cag cag aat gtc aag tcg      652
Ala Ala Tyr Ile Glu Cys Ser Ser Lys Thr Gln Gln Asn Val Lys Ser
155          160          165
gtc ttc gac aca gcc atc aaa gtg gtc ctt cag ccc ccg cgg agg agg      700
Val Phe Asp Thr Ala Ile Lys Val Val Leu Gln Pro Pro Arg Arg Arg
170          175          180
gag gcg acg cct gcc agg agg aag aac agg cgt ggc tcc ggg tgc tct      748
Glu Ala Thr Pro Ala Arg Arg Lys Asn Arg Arg Gly Ser Gly Cys Ser
185          190          195          200
atc atg aac ctc atg tgt ggc agc acg tgc gct gct taggagtcta      794
Ile Met Asn Leu Met Cys Gly Ser Thr Cys Ala Ala
205          210
gaacactgat ctggaaggag gtgaaggatga aggcattgtg tctatgtgct atggcgactg      854

gcaagttaat ggggccgcat ggatgactgc tgctcttggt tttttaagct cgtctgccgt      914

atgcttttgt ttttaggct tcaaggactg acaattgcaa gaatgcagtg tttatgtaag      974

aggttgtttg ctggaatagg attgctgt      1002

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<210> 278
 <211> 212
 <212> PRT
 <213> Zea mays

<400> 278
 Met Ser Val Thr Lys Phe Ile Lys Cys Val Thr Val Gly Asp Gly Ala
 1 5 10 15
 Val Gly Lys Thr Cys Met Leu Ile Cys Tyr Thr Ser Asn Lys Phe Pro
 20 25 30
 Thr Asp Tyr Ile Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val Ser
 35 40 45
 Val Asp Gly Ser Ile Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln
 50 55 60
 Glu Asp Tyr Ser Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp Val
 65 70 75 80
 Phe Val Leu Ala Phe Ser Leu Ile Ser Arg Ala Ser Tyr Glu Asn Val
 85 90 95
 Leu Lys Lys Trp Val Pro Glu Leu Arg Arg Phe Ala Pro Asp Val Pro
 100 105 110
 Val Val Leu Val Gly Thr Lys Leu Asp Leu Arg Asp His Arg Ala Tyr
 115 120 125
 Leu Ala Asp His Pro Gly Ala Ser Thr Ile Thr Thr Ala Gln Gly Glu
 130 135 140
 Glu Leu Arg Arg Gln Ile Gly Ala Ala Tyr Ile Glu Cys Ser Ser
 145 150 155 160
 Lys Thr Gln Gln Asn Val Lys Ser Val Phe Asp Thr Ala Ile Lys Val
 165 170 175
 Val Leu Gln Pro Pro Arg Arg Arg Glu Ala Thr Pro Ala Arg Arg Lys
 180 185 190
 Asn Arg Arg Gly Ser Gly Cys Ser Ile Met Asn Leu Met Cys Gly Ser
 195 200 205
 Thr Cys Ala Ala
 210

<210> 279
 <211> 850
 <212> DNA
 <213> Oryza sativa

<220>
 <221> CDS
 <222> (112)..(705)

<400> 279
 agcaagcagc agctgaggtg aggtccgtgg cggtggagtg aggactgagg aggaagaaga 60
 gggcgggatac tagggtaccg gatgcgctgg ctgtgctgag tgagagtaga g atg agc 117
 Met Ser
 1
 gcg tct cgg ttc atc aag tgc gtc acc gtg ggg gac ggc gcc gtg ggc 165
 Ala Ser Arg Phe Ile Lys Cys Val Thr Val Gly Asp Gly Ala Val Gly
 5 10 15
 aag acc tgc atg ctc atc tcc tac acc tcc aac acc ttc ccc acg gac 213
 Lys Thr Cys Met Leu Ile Ser Tyr Thr Ser Asn Thr Phe Pro Thr Asp
 20 25 30
 tat gtt cca act gtt ttt gat aac ttc agt gca aat gtt gtg gtc gat 261
 Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val Val Val Asp
 35 40 45 50
 ggg agc act gtg aac ttg ggg ttg tgg gat aca gca gga caa gag gac 309
 Gly Ser Thr Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln Glu Asp
 55 60 65
 tac aat agg cta cgc ccg ttg agc tat cgt ggc gct gat gtt ttc ctg 357
 Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp Val Phe Leu
 70 75 80
 ctg gcc ttt tct ctg atc agc aaa gca agc tat gag aat gtt tct aaa 405

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Leu Ala Phe Ser Leu Ile Ser Lys Ala Ser Tyr Glu Asn Val Ser Lys
 85 90 95
 aag tgg ata cct gaa tta agg cat tat gct cct ggt gtg cca ata att 453
 Lys Trp Ile Pro Glu Leu Arg His Tyr Ala Pro Gly Val Pro Ile Ile
 100 105 110
 ctc gtt gga aca aag ctt gat ctg cgg gat gat aag caa ttt ttc gta 501
 Leu Val Gly Thr Lys Leu Asp Leu Arg Asp Asp Lys Gln Phe Phe Val
 115 120 125 130
 gat cac cct ggt gct gta cct att tcc act gct cag ggc gaa gag ctg 549
 Asp His Pro Gly Ala Val Pro Ile Ser Thr Ala Gln Gly Glu Glu Leu
 135 140 145
 agg aaa ctc att ggt gca gcg gca tac att gaa tgc agt tca aaa aca 597
 Arg Lys Leu Ile Gly Ala Ala Ala Tyr Ile Glu Cys Ser Ser Lys Thr
 150 155 160
 cag caa aac atc aag gca gtt ttc gat gct gcg att aag gtg gtt ctc 645
 Gln Gln Asn Ile Lys Ala Val Phe Asp Ala Ala Ile Lys Val Val Leu
 165 170 175
 cag cct cca aag caa aag aag aag aag aaa aag gcg cag aaa gga tgt 693
 Gln Pro Pro Lys Gln Lys Lys Lys Lys Lys Ala Gln Lys Gly Cys
 180 185 190
 gcc atc ttg taattaaatg gtagacagtg cagtgcagat cgatgtatcc cttcatttgt 752
 Ala Ile Leu
 195
 agcctctggc ttcaatcgtc gcttggtgtg ataattacgc tagatgccac cggcagaaga 812

 tataatatag tcctcctgcc tttgtggtgt tggtctct 850

<210> 280

<211> 197

<212> PRT

<213> *Oryza sativa*

<400> 280

Met Ser Ala Ser Arg Phe Ile Lys Cys Val Thr Val Gly Asp Gly Ala
 1 5 10 15
 Val Gly Lys Thr Cys Met Leu Ile Ser Tyr Thr Ser Asn Thr Phe Pro
 20 25 30
 Thr Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val Val
 35 40 45
 Val Asp Gly Ser Thr Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln
 50 55 60
 Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp Val
 65 70 75 80
 Phe Leu Leu Ala Phe Ser Leu Ile Ser Lys Ala Ser Tyr Glu Asn Val
 85 90 95
 Ser Lys Lys Trp Ile Pro Glu Leu Arg His Tyr Ala Pro Gly Val Pro
 100 105 110
 Ile Ile Leu Val Gly Thr Lys Leu Asp Leu Arg Asp Asp Lys Gln Phe
 115 120 125
 Phe Val Asp His Pro Gly Ala Val Pro Ile Ser Thr Ala Gln Gly Glu
 130 135 140
 Glu Leu Arg Lys Leu Ile Gly Ala Ala Ala Tyr Ile Glu Cys Ser Ser
 145 150 155 160
 Lys Thr Gln Gln Asn Ile Lys Ala Val Phe Asp Ala Ala Ile Lys Val
 165 170 175
 Val Leu Gln Pro Lys Gln Lys Lys Lys Lys Lys Ala Gln Lys
 180 185 190
 Gly Cys Ala Ile Leu
 195

<210> 281

<211> 800

<212> DNA

<213> *Suillus bovinus*

<220>

<221> CDS

<222> (123) .. (707)

<400> 281

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tgcgcacaca ttgctctcct tgagggttc tctttcaggc aaccaagtag gattcaatca      120

ga atg cac aac atc aaa tgt gtt gta gtc ggc gat ggt gct gtt ggc      167
Met His Asn Ile Lys Cys Val Val Val Gly Asp Gly Ala Val Gly
1      5      10      15
aag acg tgt ctt ctc atc tct tat acc aca aat gcc ttt cca gga gaa      215
Lys Thr Cys Leu Leu Ile Ser Tyr Thr Thr Asn Ala Phe Pro Gly Glu
20      25      30
tac gtg cca aca gta ttc gac aac tac tct gca aat gtg atg gtc gac      263
Tyr Val Pro Thr Val Phe Asp Asn Tyr Ser Ala Asn Val Met Val Asp
35      40      45
ggg aaa act atc tct ctc ggt cta tgg gat acc gct gga caa gaa gat      311
Gly Lys Thr Ile Ser Leu Gly Leu Trp Asp Thr Ala Gly Gln Glu Asp
50      55      60
tac gat cgt ctc cgg cca ctc tcc tac cct caa aca gat gtc ttt ttg      359
Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Gln Thr Asp Val Phe Leu
65      70      75
atc tgt ttc tcg ctc gtc agt cca cct agc tac gag aac gtt aga acc      407
Ile Cys Phe Ser Leu Val Ser Pro Pro Ser Tyr Glu Asn Val Arg Thr
80      85      90      95
aag tgg tgg cct gag att tca cat cat gcg cca tct act tcg gtg gtc      455
Lys Trp Trp Pro Glu Ile Ser His His Ala Pro Ser Thr Ser Val Val
100      105      110
ttg gtt ggc act aaa ctg gat ttg cgt gaa gat cct gct acc atc gag      503
Leu Val Gly Thr Lys Leu Asp Leu Arg Glu Asp Pro Ala Thr Ile Glu
115      120      125
aaa ctc cgt gac cgg cgt atg cag cct atc cag tac acg caa ggg gtc      551
Lys Leu Arg Asp Arg Arg Met Gln Pro Ile Gln Tyr Thr Gln Gly Val
130      135      140
tcg atg gcg agg gat att ggc gcc gtc aag tat ctt gaa tgt tct gcg      599
Ser Met Ala Arg Asp Ile Gly Ala Val Lys Tyr Leu Glu Cys Ser Ala
145      150      155
cta tcg caa aag ggc cta aag acc gtg ttt gat gag gtt atc cgt gct      647
Leu Ser Gln Lys Gly Leu Lys Thr Val Phe Asp Glu Val Ile Arg Ala
160      165      170      175
gtt ttg aac cct ccc ccg aag gaa aag aag cgc agt ggt cgt ggt tgt      695
Val Leu Asn Pro Pro Lys Glu Lys Lys Arg Ser Gly Arg Gly Cys
180      185      190
gtt atc gta tgagtggatt tgccattcca catgctcata tagatggatt ttctttgttt      754
Val Ile Val

tatcatatca cgcccattta tggtgttgct tctgttaaaa aaaaaa      800

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<210> 282

<211> 194

<212> PRT

<213> Suillus bovinus

<400> 282

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Met His Asn Ile Lys Cys Val Val Val Gly Asp Gly Ala Val Gly Lys
1      5      10      15
Thr Cys Leu Leu Ile Ser Tyr Thr Thr Asn Ala Phe Pro Gly Glu Tyr
20      25      30
Val Pro Thr Val Phe Asp Asn Tyr Ser Ala Asn Val Met Val Asp Gly
35      40      45

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Lys Thr Ile Ser Leu Gly Leu Trp Asp Thr Ala Gly Gln Glu Asp Tyr
 50 55 60
 Asp Arg Leu Arg Pro Leu Ser Tyr Pro Gln Thr Asp Val Phe Leu Ile
 65 70 75 80
 Cys Phe Ser Leu Val Ser Pro Pro Ser Tyr Glu Asn Val Arg Thr Lys
 85 90 95
 Trp Trp Pro Glu Ile Ser His His Ala Pro Ser Thr Ser Val Val Leu
 100 105 110
 Val Gly Thr Lys Leu Asp Leu Arg Glu Asp Pro Ala Thr Ile Glu Lys
 115 120 125
 Leu Arg Asp Arg Arg Met Gln Pro Ile Gln Tyr Thr Gln Gly Val Ser
 130 135 140
 Met Ala Arg Asp Ile Gly Ala Val Lys Tyr Leu Glu Cys Ser Ala Leu
 145 150 155 160
 Ser Gln Lys Gly Leu Lys Thr Val Phe Asp Glu Val Ile Arg Ala Val
 165 170 175
 Leu Asn Pro Pro Pro Lys Glu Lys Lys Arg Ser Gly Arg Gly Cys Val
 180 185 190
 Ile Val

<210> 283

<211> 1065

<212> DNA

<213> Suillus bovinus

<220>

<221> CDS

<222> (170)..(745)

<400> 283

gccaacatcg acaccgtact ttctcatttc ttctaccgac gtcctgttcg taaattagag 60

 tcaaccttct ctgtcgtgat tgggttaata gcatttcctc gcttcaactc tcctccttga 120

 attttccgga agaatcgcca agtttatcac gtagaaccat ctcaacgac atg cag act 178
 Met Gln Thr
 1
 atc aag gtt gta gtg gtg ggg gac ggt gct gta ggc aag act tgt ttg 226
 Ile Lys Val Val Val Val Gly Asp Gly Ala Val Gly Lys Thr Cys Leu
 5 10 15
 ttg atc tca tac acc acg aac aaa ttt cca agc gac tat gtt ccg act 274
 Leu Ile Ser Tyr Thr Thr Asn Lys Phe Pro Ser Asp Tyr Val Pro Thr
 20 25 30 35
 gtc ttc gat aac tac gct gtc act gta atg att ggt gaa gat cct tac 322
 Val Phe Asp Asn Tyr Ala Val Thr Val Met Ile Gly Glu Asp Pro Tyr
 40 45 50
 aca cta ggt ctt ttc gac acc gcc ggg caa gag gat tat gac cgt ctc 370
 Thr Leu Gly Leu Phe Asp Thr Ala Gly Gln Glu Asp Tyr Asp Arg Leu
 55 60 65
 cgg cca ctg tca tac ccc caa acc gac gtc ttc ctt gtt tgc ttt agt 418
 Arg Pro Leu Ser Tyr Pro Gln Thr Asp Val Phe Leu Val Cys Phe Ser
 70 75 80
 gta acg tcc cct cca tcc ttc gag aac gtg agg gag aaa tgg att ccg 466
 Val Thr Ser Pro Pro Ser Phe Glu Asn Val Arg Glu Lys Trp Ile Pro
 85 90 95
 gag gta cac cat cat tgt ccg ggt gtc cca tgt ctt atc gtt ggg acg 514
 Glu Val His His His Cys Pro Gly Val Pro Cys Leu Ile Val Gly Thr
 100 105 110 115
 caa atc gat ttg cgg gac gac gct caa gtg att gag aag ctc tcc agg 562
 Gln Ile Asp Leu Arg Asp Asp Ala Gln Val Ile Glu Lys Leu Ser Arg
 120 125 130
 cag aag caa cga cgt gtg ccg acc gag cac ggc gag agg ctt tcc aga 610
 Gln Lys Gln Arg Pro Val Pro Thr Glu His Gly Glu Arg Leu Ser Arg
 135 140 145
 gag ctt ggt gcc gtc aag tac gtg gag tgc tca gcc ctg acg cag aaa 658

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Glu Leu Gly Ala Val Lys Tyr Val Glu Cys Ser Ala Leu Thr Gln Lys
 150 155 160
 ggg ttg aag aac gtc ttc gac gag gct att gtc gct gcg cta gag cca 706
 Gly Leu Lys Asn Val Phe Asp Glu Ala Ile Val Ala Ala Leu Glu Pro
 165 170 175
 ccc gtg gtt aag aag aca cat aaa tgc gtc gtc gtt taatgaatga 752
 Pro Val Val Lys Lys Thr His Lys Cys Val Val Val
 180 185 190
 tccatcacga cggtagagct tgttttatct tcttatgact cctttacgcc ttgttctgcc 812

 tcatatatcc ttctcatctt tttttatgtc gtttctctcg ttgcgccaag acatcatgat 872

 ttccctagt cctgttgcat ctgttctctt ccgcacgagc tgagtggact tgagctatct 932

 cgtgctctta aagaagctga tctcatccgt ctttctacac cacaattgat gactagtctg 992

 tattgttggga actgttgggt ttgataggaa tttaataccc atgacgggga cttgtcatgt 1052

 caaaaaaaaaaaa aaa 1065

<210> 284

<211> 191

<212> PRT

<213> Suillus bovinus

<400> 284

Met Gln Thr Ile Lys Val Val Val Val Gly Asp Gly Ala Val Gly Lys
 1 5 10 15
 Thr Cys Leu Leu Ile Ser Tyr Thr Thr Asn Lys Phe Pro Ser Asp Tyr
 20 25 30
 Val Pro Thr Val Phe Asp Asn Tyr Ala Val Thr Val Met Ile Gly Glu
 35 40 45
 Asp Pro Tyr Thr Leu Gly Leu Phe Asp Thr Ala Gly Gln Glu Asp Tyr
 50 55 60
 Asp Arg Leu Arg Pro Leu Ser Tyr Pro Gln Thr Asp Val Phe Leu Val
 65 70 75 80
 Cys Phe Ser Val Thr Ser Pro Pro Ser Phe Glu Asn Val Arg Glu Lys
 85 90 95
 Trp Ile Pro Glu Val His His His Cys Pro Gly Val Pro Cys Leu Ile
 100 105 110
 Val Gly Thr Gln Ile Asp Leu Arg Asp Asp Ala Gln Val Ile Glu Lys
 115 120 125
 Leu Ser Arg Gln Lys Gln Arg Pro Val Pro Thr Glu His Gly Glu Arg
 130 135 140
 Leu Ser Arg Glu Leu Gly Ala Val Lys Tyr Val Glu Cys Ser Ala Leu
 145 150 155 160
 Thr Gln Lys Gly Leu Lys Asn Val Phe Asp Glu Ala Ile Val Ala Ala
 165 170 175
 Leu Glu Pro Pro Val Val Lys Lys Thr His Lys Cys Val Val Val
 180 185 190

<210> 285

<211> 576

<212> DNA

<213> Yarrowia lipolytica

<220>

<221> CDS

<222> (1) .. (576)

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<400> 285
 atg cag acc ata aaa tgt gtt gtt gtc ggc gat ggt gcc gtc gga aag 48
 Met Gln Thr Ile Lys Cys Val Val Val Gly Asp Gly Ala Val Gly Lys
 1 5 10 15
 act tgt ctc ctc atc tca tac aca aca aac aag ttc ccc tct gaa tac 96
 Thr Cys Leu Leu Ile Ser Tyr Thr Thr Asn Lys Phe Pro Ser Glu Tyr
 20 25 30
 gtt ccc acc gtt ttt gac aac tat gcc gtg act gtc atg att gga gac 144
 Val Pro Thr Val Phe Asp Asn Tyr Ala Val Thr Val Met Ile Gly Asp
 35 40 45
 gag ccc tac aca ctc gga ctg ttc gac acc gcc ggt cag gag gat tac 192
 Glu Pro Tyr Thr Leu Gly Leu Phe Asp Thr Ala Gly Gln Glu Asp Tyr
 50 55 60
 gac cga ctg cga cct ctt tgt tac cct cag acc gat gtt ttc ctc gtc 240
 Asp Arg Leu Arg Pro Leu Cys Tyr Pro Gln Thr Asp Val Phe Leu Val
 65 70 75 80
 tgc ttt tcc gtc acc tct ccc gcc tcc ttt gag aac gtc aag gag aag 288
 Cys Phe Ser Val Thr Ser Pro Ala Ser Phe Glu Asn Val Lys Glu Lys
 85 90 95
 tgg ttc cct gag gtc cac cac cac tgc ccc gcc gtg cct tgc ctc att 336
 Trp Phe Pro Glu Val His His His Cys Pro Gly Val Pro Cys Leu Ile
 100 105 110
 gtt ggt acc cag gtt gat ccg cga agt gac agg atg att ctt gac aag 384
 Val Gly Thr Gln Val Asp Pro Arg Ser Asp Arg Met Ile Leu Asp Lys
 115 120 125
 ctt tcc cga cac aag ctg cga ccc atg acc act gag caa gcc tac cag 432
 Leu Ser Arg His Lys Leu Arg Pro Met Thr Thr Glu Gln Gly Tyr Gln
 130 135 140
 ctc gcc cga gaa ctc ggt gcc gtc aag tac gtc gag tgt tct gcc ctt 480
 Leu Ala Arg Glu Leu Gly Ala Val Lys Tyr Val Glu Cys Ser Ala Leu
 145 150 155 160
 act cag aag ggt ctc aag gac gtt ttc gac gag gcc atc gtg gca gct 528
 Thr Gln Lys Gly Leu Lys Asp Val Phe Asp Glu Ala Ile Val Ala Ala
 165 170 175
 ctt gag cct cca gtg gtc aag aag aac aaa aag tgc att gtg ctc 573
 Leu Glu Pro Pro Val Val Lys Lys Asn Lys Lys Cys Ile Val Leu
 180 185 190
 tag 576

<210> 286

<211> 191

<212> PRT

<213> Yarrowia lipolytica

<400> 286

Met Gln Thr Ile Lys Cys Val Val Val Gly Asp Gly Ala Val Gly Lys
 1 5 10 15
 Thr Cys Leu Leu Ile Ser Tyr Thr Thr Asn Lys Phe Pro Ser Glu Tyr
 20 25 30
 Val Pro Thr Val Phe Asp Asn Tyr Ala Val Thr Val Met Ile Gly Asp
 35 40 45
 Glu Pro Tyr Thr Leu Gly Leu Phe Asp Thr Ala Gly Gln Glu Asp Tyr
 50 55 60
 Asp Arg Leu Arg Pro Leu Cys Tyr Pro Gln Thr Asp Val Phe Leu Val
 65 70 75 80
 Cys Phe Ser Val Thr Ser Pro Ala Ser Phe Glu Asn Val Lys Glu Lys
 85 90 95
 Trp Phe Pro Glu Val His His His Cys Pro Gly Val Pro Cys Leu Ile
 100 105 110
 Val Gly Thr Gln Val Asp Pro Arg Ser Asp Arg Met Ile Leu Asp Lys
 115 120 125
 Leu Ser Arg His Lys Leu Arg Pro Met Thr Thr Glu Gln Gly Tyr Gln
 130 135 140
 Leu Ala Arg Glu Leu Gly Ala Val Lys Tyr Val Glu Cys Ser Ala Leu
 145 150 155 160

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Thr Gln Lys Gly Leu Lys Asp Val Phe Asp Glu Ala Ile Val Ala Ala
 165 170 175
 Leu Glu Pro Pro Val Val Lys Lys Asn Lys Lys Cys Ile Val Leu
 180 185 190

<210> 287

<211> 1157

<212> DNA

<213> *Ashbya gossypii*

<220>

<221> CDS

<222> (192)..(971)

<400> 287

gcaagagcct taaatcacct gcatcccccg atttcaacac ccttggttaga aagaggtaaa 60

cagatcacca cggcgccagt aggtgaaaat cggcaggcag tgggtggcgt tcaggacgcg 120

gcaaggaagg gcagtggaag caatcgcggt cggttttagcg ggacagcgcg tcaagaggca 180

gacagaacga a atg agc gca ggg ccg ttg caa gct gcg cca aag aag aat 230

Met Ser Ala Gly Pro Leu Gln Ala Ala Pro Lys Lys Asn

tac gga gca ctg ata ggc gcg ggg ccg gcg gtg ggc ggg gcg gca ttc 278

Tyr Gly Ala Leu Ile Gly Ala Gly Pro Ala Val Gly Gly Ala Ala Phe

aac cgg acg ctg agc gag gtt gcg agc tac gag cgc agc cgg cgc gac 326

Asn Arg Thr Leu Ser Glu Val Ala Ser Tyr Glu Arg Ser Arg Arg Asp

cac gcg acg ccg gac tac cgg atc aag atc gtg gtg gtg ggg gac ggc 374

His Ala Thr Pro Asp Tyr Arg Ile Lys Ile Val Val Val Gly Asp Gly

gcg acg ggg aag acg tct ctg ctg atg tcg tac aca cag ggc cag ttc 422

Ala Thr Gly Lys Thr Ser Leu Leu Met Ser Tyr Thr Gln Gly Gln Phe

cca gag gac tac gtg ccg acc atc ttc gag aac tac gtg acg aac att 470

Pro Glu Asp Tyr Val Pro Thr Ile Phe Glu Asn Tyr Val Thr Asn Ile

gag ggc cca cgc ggg aag gtg atc gag ctg gcg ctg tgg gac act gct 518

Glu Gly Pro Arg Gly Lys Val Ile Glu Leu Ala Leu Trp Asp Thr Ala

ggg cag gag gag tac agc cgg ctg cgg ccg ctg tct tac ggg gac gtg 566

Gly Gln Glu Glu Tyr Ser Arg Leu Arg Pro Leu Ser Tyr Gly Asp Val

gac atc gtg atg gtg tgc tac gcg gca gac aac cgc acg tcg ctg acg 614

Asp Ile Val Met Val Cys Tyr Ala Ala Asp Asn Arg Thr Ser Leu Thr

aac gcg gaa gag ctg tgg ttc ccg gag gtg cgc cac ttc tgc ccg cac 662

Asn Ala Glu Glu Leu Trp Phe Pro Glu Val Arg His Phe Cys Pro His

gcg ccg atg atg ctg gtg ggg ctc aag agc gac ctg tac tcg ctt gat 710

Ala Pro Met Met Leu Val Gly Leu Lys Ser Asp Leu Tyr Ser Leu Asp

gcg ctg gac cgg ctc gtg gac ccg acg gac gcg gaa ctg gtg gcg cgc 758

Ala Leu Asp Arg Leu Val Asp Pro Thr Asp Ala Glu Leu Val Ala Arg

aag atg ggc gcc ttc gtg cac ctg cag tgc tcg gcc aag acg cga cag 806

Lys Met Gly Ala Phe Val His Leu Gln Cys Ser Ala Lys Thr Arg Gln

tgc ctg gag gac gtg ttc aac acg gcg ata cac acg gcg ctg tac gac 854

Cys Leu Glu Asp Val Phe Asn Thr Ala Ile His Thr Ala Leu Tyr Asp

gag ctg cgc gcg ccc ccg cag cgc ggg gtg aag ggc atg ttc aag aag 902

Glu Leu Arg Ala Pro Pro Gln Arg Gly Val Lys Gly Met Phe Lys Lys

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225 230 235
 aag cag cag cgg gac ccg cag gcg cag tct tac aag cgg gtg cgc aag 950
 Lys Gln Gln Arg Asp Pro Gln Ala Gln Ser Tyr Lys Arg Val Arg Lys
 240 245 250
 cac cgc tgt gtg gtc cta tagcgacacgt gacagccatg tttcgccggc 998
 His Arg Cys Val Val Leu
 255
 cctgggttcct ggcagcggag gcgcaagcgc cgcgcggcg cgcctagtcc gctgtcgagg 1058

 cctgcgtgac cgtgtagtta ggcattctagt cgtagcgagc caagatgtta gtttaaactcg 1118

 atcggtgcga cagcatcttg ttaggataga gtactggga 1157

<210> 288

<211> 259

<212> PRT

<213> Ashbya gossypii

<400> 288

Met Ser Ala Gly Pro Leu Gln Ala Ala Pro Lys Lys Asn Tyr Gly Ala
 1 5 10 15
 Leu Ile Gly Ala Gly Pro Ala Val Gly Gly Ala Ala Phe Asn Arg Thr
 20 25 30
 Leu Ser Glu Val Ala Ser Tyr Glu Arg Ser Arg Arg Asp His Ala Thr
 35 40 45
 Pro Asp Tyr Arg Ile Lys Ile Val Val Val Gly Asp Gly Ala Thr Gly
 50 55 60
 Lys Thr Ser Leu Leu Met Ser Tyr Thr Gln Gly Gln Phe Pro Glu Asp
 65 70 75 80
 Tyr Val Pro Thr Ile Phe Glu Asn Tyr Val Thr Asn Ile Glu Gly Pro
 85 90 95
 Arg Gly Lys Val Ile Glu Leu Ala Leu Trp Asp Thr Ala Gly Gln Glu
 100 105 110
 Glu Tyr Ser Arg Leu Arg Pro Leu Ser Tyr Gly Asp Val Asp Ile Val
 115 120 125
 Met Val Cys Tyr Ala Ala Asp Asn Arg Thr Ser Leu Thr Asn Ala Glu
 130 135 140
 Glu Leu Trp Phe Pro Glu Val Arg His Phe Cys Pro His Ala Pro Met
 145 150 155 160
 Met Leu Val Gly Leu Lys Ser Asp Leu Tyr Ser Leu Asp Ala Leu Asp
 165 170 175
 Arg Leu Val Asp Pro Thr Asp Ala Glu Leu Val Ala Arg Lys Met Gly
 180 185 190
 Ala Phe Val His Leu Gln Cys Ser Ala Lys Thr Arg Gln Cys Leu Glu
 195 200 205
 Asp Val Phe Asn Thr Ala Ile His Thr Ala Leu Tyr Asp Glu Leu Arg
 210 215 220
 Ala Pro Pro Gln Arg Gly Val Lys Gly Met Phe Lys Lys Lys Gln Gln
 225 230 235 240
 Arg Asp Pro Gln Ala Gln Ser Tyr Lys Arg Val Arg Lys His Arg Cys
 245 250 255
 Val Val Leu

<210> 289

<211> 1067

<212> DNA

<213> Oryza sativa

<220>

<221> CDS

<222> (131)..(775)

<400> 289

aagaacgaac aactcttctc cccctctccc cctccttccct tgcctcctcct cccatcttgt 60

ctcctccctc tctctcgcaa agtcgcaacg cgctcctcct cggtgaaacg ggagtggagt 120

gcgtgoggcc atg gcg tcc agc gcc tcc cgg ttc atc aag tgc gtc acg 169
Met Ala Ser Ser Ala Ser Arg Phe Ile Lys Cys Val Thr
1 5 10
gtg ggc gac ggc gcc gtg ggc aag acc tgc atg ctc atc tgc tac acc 217
Val Gly Asp Gly Ala Val Gly Lys Thr Cys Met Leu Ile Cys Tyr Thr
15 20 25
agc aac aag ttc ccc act gac tac ata cca acg gtg ttc gac aat ttc 265
Ser Asn Lys Phe Pro Thr Asp Tyr Ile Pro Thr Val Phe Asp Asn Phe
30 35 40 45
agc gca aac gtt gtt gtg gac agc acc acg gtg aat ctg ggc ctc tgg 313
Ser Ala Asn Val Val Val Asp Ser Thr Thr Val Asn Leu Gly Leu Trp
50 55 60
gat act gct ggg caa gag gat tac aac cgg ctc agg cct ctg agc tat 361
Asp Thr Ala Gly Gln Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr
65 70 75
cgt ggt gct gat gtt ttc gtg ctt gcc ttc tct ctt gtg agc cga gct 409
Arg Gly Ala Asp Val Phe Val Leu Ala Phe Ser Leu Val Ser Arg Ala
80 85 90
agc tat gaa aat att atg aag aag tgg ata ccg gag cta cag cat tat 457
Ser Tyr Glu Asn Ile Met Lys Lys Trp Ile Pro Glu Leu Gln His Tyr
95 100 105
gca ccc ggc gtg ccc att gtg ttg gtt ggc aca aaa ttg gat ctc cgt 505
Ala Pro Gly Val Pro Ile Val Leu Val Gly Thr Lys Leu Asp Leu Arg
110 115 120 125
gaa gac aag cac tac ttg ttg gac cat cct ggc atg ata cct gtt acc 553
Glu Asp Lys His Tyr Leu Leu Asp His Pro Gly Met Ile Pro Val Thr
130 135 140
aca gca cag ggt gaa gaa ctt cga aaa caa ata ggt gct gct tat tac 601
Thr Ala Gln Gly Glu Glu Leu Arg Lys Gln Ile Gly Ala Ala Tyr Tyr
145 150 155
att gag tgc agc tca aag aca caa cag aat gtc aaa ggt gtg ttt gat 649
Ile Glu Cys Ser Ser Lys Thr Gln Gln Asn Val Lys Gly Val Phe Asp
160 165 170
gct gct atc aag gta gta atc cag cct cca act aag cag agg gaa aag 697
Ala Ala Ile Lys Val Val Ile Gln Pro Pro Thr Lys Lys Arg Glu Lys
175 180 185
aag aaa aag aaa tca cga caa gga tgc tct atg atg aac atg ttc cgt 745
Lys Lys Lys Lys Ser Arg Gln Gly Cys Ser Met Met Asn Met Phe Arg
190 195 200 205
gga agg aaa atg tca tgc ttc aaa tcc tgattgatcg agatgtccct 792
Gly Arg Lys Met Ser Cys Phe Lys Ser
210
tacatgatgc aatgttctgg gtgcaacctc aagctggcaa cctttggagt ctgaatgtgc 852

tggtagagtt agatgcaaag ttcttgtgta tatttgcac ttttggtaat taattactag 912

agttagatgg ttaaactagt ctgcttatgt accgcacaat gcttnttatt attagctctt 972

gttgggtctag aaagtctgat agatgccaaa ggaacaagga gacaccgttc tgtcaggaca 1032

aatcacaga ttttghtaat aaaaaaaaaa aaaaa 1067

<210> 290

<211> 214

217/291

<212> PRT

<213> Oryza sativa

<400> 290

Met Ala Ser Ser Ala Ser Arg Phe Ile Lys Cys Val Thr Val Gly Asp
 1 5 10 15
 Gly Ala Val Gly Lys Thr Cys Met Leu Ile Cys Tyr Thr Ser Asn Lys
 20 25 30
 Phe Pro Thr Asp Tyr Ile Pro Thr Val Phe Asp Asn Phe Ser Ala Asn
 35 40 45
 Val Val Val Asp Ser Thr Thr Val Asn Leu Gly Leu Trp Asp Thr Ala
 50 55 60
 Gly Gln Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala
 65 70 75 80
 Asp Val Phe Val Leu Ala Phe Ser Leu Val Ser Arg Ala Ser Tyr Glu
 85 90 95
 Asn Ile Met Lys Lys Trp Ile Pro Glu Leu Gln His Tyr Ala Pro Gly
 100 105 110
 Val Pro Ile Val Leu Val Gly Thr Lys Leu Asp Leu Arg Glu Asp Lys
 115 120 125
 His Tyr Leu Leu Asp His Pro Gly Met Ile Pro Val Thr Thr Ala Gln
 130 135 140
 Gly Glu Glu Leu Arg Lys Gln Ile Gly Ala Ala Tyr Tyr Ile Glu Cys
 145 150 155 160
 Ser Ser Lys Thr Gln Gln Asn Val Lys Gly Val Phe Asp Ala Ala Ile
 165 170 175
 Lys Val Val Ile Gln Pro Pro Thr Lys Gln Arg Glu Lys Lys Lys Lys
 180 185 190
 Lys Ser Arg Gln Gly Cys Ser Met Met Asn Met Phe Arg Gly Arg Lys
 195 200 205
 Met Ser Cys Phe Lys Ser
 210

<210> 291

<211> 1087

<212> DNA

<213> Oryza sativa

<220>

<221> CDS

<222> (141)..(785)

<400> 291

aacaaagcag cttgccaccg tccctgcctc tcttgctttg ctttgccttc tcggagaaga 60

caaatctact gtagctgctt gtctctgttc gccggtggcg accgtgagag gaggaggtag 120

tcctagtcct agtaggcgag atg agc ggc gcc acc aag ttc atc aag tgc gtc 173
 Met Ser Gly Ala Thr Lys Phe Ile Lys Cys Val
 1 5 10

acc gtc ggc gac ggc gcc gtc ggc aag acc tgc atg ctc atc tgc tac 221
 Thr Val Gly Asp Gly Ala Val Gly Lys Thr Cys Met Leu Ile Cys Tyr
 15 20 25

acc agc aac aag ttc ccc acc gat tac atc ccc acc gtg ttc gac aac 269
 Thr Ser Asn Lys Phe Pro Thr Asp Tyr Ile Pro Thr Val Phe Asp Asn
 30 35 40

ttc agt gct aat gtt tca gtg gat ggg aac atc gtc aac ttg gga tta 317
 Phe Ser Ala Asn Val Ser Val Asp Gly Asn Ile Val Asn Leu Gly Leu
 45 50 55

tgg gac act gct gga caa gag gat tac agc agg ctg agg cca ctg agc 365
 Trp Asp Thr Ala Gly Gln Glu Asp Tyr Ser Arg Leu Arg Pro Leu Ser
 60 65 70 75

tac agg gga gcg gat ata ttt gtg ctg gca ttc tca ctg atc agc aga 413
 Tyr Arg Gly Ala Asp Ile Phe Val Leu Ala Phe Ser Leu Ile Ser Arg
 80 85 90

gca agc tat gag aat gtt ctc aag aag tgg atg ccg gag ctt cgc cgg 461

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Ala	Ser	Tyr	Glu	Asn	Val	Leu	Lys	Lys	Trp	Met	Pro	Glu	Leu	Arg	Arg		
			95					100					105				
ttc	gca	ccg	aat	gtt	cca	att	gtt	ctt	gtt	ggg	acc	aag	tta	gat	cta	509	
Phe	Ala	Pro	Asn	Val	Pro	Ile	Val	Leu	Val	Gly	Thr	Lys	Leu	Asp	Leu		
		110					115					120					
cgt	gac	cac	aga	tct	tac	ctt	gcg	gac	cat	cct	gct	gct	tcc	gca	att	557	
Arg	Asp	His	Arg	Ser	Tyr	Leu	Ala	Asp	His	Pro	Ala	Ala	Ser	Ala	Ile		
		125				130					135						
acg	act	gca	cag	ggg	gaa	gaa	ctt	aga	aag	cag	ata	ggc	gcc	gcg	gcc	605	
Thr	Thr	Ala	Gln	Gly	Glu	Glu	Leu	Arg	Lys	Gln	Ile	Gly	Ala	Ala	Ala		
		140				145				150					155		
tac	atc	gaa	tgc	agt	tcg	aaa	aca	caa	cag	aac	atc	aag	gcc	gtg	ttt	653	
Tyr	Ile	Glu	Cys	Ser	Ser	Lys	Thr	Gln	Gln	Asn	Ile	Lys	Ala	Val	Phe		
			160						165					170			
gat	act	gcc	atc	aag	gtg	gtc	ctt	cag	cct	cct	cgg	aga	agg	ggg	gag	701	
Asp	Thr	Ala	Ile	Lys	Val	Val	Leu	Gln	Pro	Pro	Arg	Arg	Arg	Gly	Glu		
		175						180						185			
acg	acg	atg	gca	agg	aag	aag	aca	agg	cga	agg	acc	ggc	tgc	tcg	tta	749	
Thr	Thr	Met	Ala	Arg	Lys	Lys	Thr	Arg	Arg	Ser	Thr	Gly	Cys	Ser	Leu		
		190					195				200						
aag	aac	ttg	atg	tgt	ggc	agt	gca	tgt	gtt	gtt	taggac	ctgt	ctga	att	ctt	802	
Lys	Asn	Leu	Met	Cys	Gly	Ser	Ala	Cys	Val	Val							
		205				210											
gaaggtgtgt	aagcgttgtg	taatggcaag	tgaatttgct	gactgttctg	ctgcttccat											862	
ttactactac	taagctcttt	cgtgtgtttg	aattactaca	tctaaaacta	gagcatcagg											922	
ctcatagact	gacttcatat	caggtgtttg	tatcattaat	attattatgt	aagaagggtg											982	
tggtttgtgg	aacaactaaa	tacaacaatg	caggctatgt	tgtactatgc	tctgctactg											1042	
gtgtttgtta	taaatatcac	atcctgctaa	aaaaaaaaaa	aaaaaa												1087	

<210> 292

<211> 214

<212> PRT

<213> Oryza sativa

<400> 292

Met	Ser	Gly	Ala	Thr	Lys	Phe	Ile	Lys	Cys	Val	Thr	Val	Gly	Asp	Gly		
1				5					10					15			
Ala	Val	Gly	Lys	Thr	Cys	Met	Leu	Ile	Cys	Tyr	Thr	Ser	Asn	Lys	Phe		
		20					25						30				
Pro	Thr	Asp	Tyr	Ile	Pro	Thr	Val	Phe	Asp	Asn	Phe	Ser	Ala	Asn	Val		
		35				40						45					
Ser	Val	Asp	Gly	Asn	Ile	Val	Asn	Leu	Gly	Leu	Trp	Asp	Thr	Ala	Gly		
		50				55					60						
Gln	Glu	Asp	Tyr	Ser	Arg	Leu	Arg	Pro	Leu	Ser	Tyr	Arg	Gly	Ala	Asp		
		65			70				75					80			
Ile	Phe	Val	Leu	Ala	Phe	Ser	Leu	Ile	Ser	Arg	Ala	Ser	Tyr	Glu	Asn		
			85						90					95			
Val	Leu	Lys	Lys	Trp	Met	Pro	Glu	Leu	Arg	Arg	Phe	Ala	Pro	Asn	Val		
		100							105				110				
Pro	Ile	Val	Leu	Val	Gly	Thr	Lys	Leu	Asp	Leu	Arg	Asp	His	Arg	Ser		
		115				120						125					
Tyr	Leu	Ala	Asp	His	Pro	Ala	Ala	Ser	Ala	Ile	Thr	Thr	Ala	Gln	Gly		
		130				135						140					
Glu	Glu	Leu	Arg	Lys	Gln	Ile	Gly	Ala	Ala	Ala	Tyr	Ile	Glu	Cys	Ser		
		145			150					155				160			
Ser	Lys	Thr	Gln	Gln	Asn	Ile	Lys	Ala	Val	Phe	Asp	Thr	Ala	Ile	Lys		
			165						170					175			

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Val Val Leu Gln Pro Pro Arg Arg Arg Gly Glu Thr Thr Met Ala Arg
 180 185 190
 Lys Lys Thr Arg Arg Ser Thr Gly Cys Ser Leu Lys Asn Leu Met Cys
 195 200 205
 Gly Ser Ala Cys Val Val
 210

<210> 293
 <211> 1059
 <212> DNA
 <213> Cicer arietinum

<220>
 <221> CDS
 <222> (118)..(711)

<400> 293
 cttcttcacgc ccttcttctt gatcattcat tcgttcattc accaagtctg aacttgaacg 60

 cacaacagca ttaccacatg agtaattagg gtttatacag caacaagaaa cataaaa 117

 atg agt ggg tcc agg ttc att aag tgt gtt acc gta ggt gac ggt gcc 165
 Met Ser Gly Ser Arg Phe Ile Lys Cys Val Thr Val Gly Asp Gly Ala
 1 5 10 15
 gta ggc aag act tgt ttg ctt atc tcc tac acc agc aac act ttc cct 213
 Val Gly Lys Thr Cys Leu Leu Ile Ser Tyr Thr Ser Asn Thr Phe Pro
 20 25 30
 acg gac tat gtg cct act gtc ttt gat aat ttc agt gca aat gta gtt 261
 Thr Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val Val
 35 40 45
 gtg gat ggg agc act ata aat ctg ggt ttg tgg gat act gct ggc caa 309
 Val Asp Gly Ser Thr Ile Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln
 50 55 60
 gaa gat tac aat aga tta aga ccc tta agc tat cgt gga gcg gat gtt 357
 Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp Val
 65 70 75 80
 ttc ctg ctt gct ttc tca ctc ata agc agg gcc agc tat gaa aat atc 405
 Phe Leu Leu Ala Phe Ser Leu Ile Ser Arg Ala Ser Tyr Glu Asn Ile
 85 90 95
 gcc aag aaa tgg att cct gag ttg agg cat tat gct cct ggt gtt cca 453
 Ala Lys Lys Trp Ile Pro Glu Leu Arg His Tyr Ala Pro Gly Val Pro
 100 105 110
 att att ctc gtt gga aca aaa ctt gat ctt cgg gat gat aag caa ttc 501
 Ile Ile Leu Val Gly Thr Lys Leu Asp Leu Arg Asp Asp Lys Gln Phe
 115 120 125
 ttt caa gac cat cct ggt gcg gtg cca atc acc aca gca cag ggt gag 549
 Phe Gln Asp His Pro Gly Ala Val Pro Ile Thr Thr Ala Gln Gly Glu
 130 135 140
 gaa ctg aga aag ctt att ggt gct cca gtt tac att gaa tgt agt tcc 597
 Glu Leu Arg Lys Leu Ile Gly Ala Pro Val Tyr Ile Glu Cys Ser Ser
 145 150 155 160
 aaa aca caa aag aat gtg aag gct gtt ttt gat gcg gcc atc aaa gta 645
 Lys Thr Gln Lys Asn Val Lys Ala Val Phe Asp Ala Ala Ile Lys Val
 165 170 175
 gtt cta cag ccg cca aag caa aag aaa act aag aga aag ggg caa aaa 693
 Val Leu Gln Pro Pro Lys Gln Lys Lys Thr Lys Arg Lys Gly Gln Lys
 180 185 190
 gcc tgt tcc att ttg tgatcttcag ttcttcatat tgtagttggt ggagaggacg 748
 Ala Cys Ser Ile Leu
 195
 acatgatagt aaccatttcc tggtagtctt tgccattctg attctatatc ttaccctatt 808

 ttcaacctac atggaggaat cgacgtgtcc aactgagtc taactacata aggtttgctt 868

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ataagcatca agctatttgt ctctggctga aggatatatg taaagtcata atttcaaca 928

tgtttggtgt gtagaacaac tcttggtgtt ctctgggatg tttttacctg ttgtattgat 988

tattaaatga ccatctccaa ttgtggacat. gggttttact cacattgtaa tctaattctag 1048

gaagtgccttg c 1059

<210> 294

<211> 197

<212> PRT

<213> Cicer arietinum

<400> 294

Met	Ser	Gly	Ser	Arg	Phe	Ile	Lys	Cys	Val	Thr	Val	Gly	Asp	Gly	Ala
1			5					10					15		
Val	Gly	Lys	Thr	Cys	Leu	Leu	Ile	Ser	Tyr	Thr	Ser	Asn	Thr	Phe	Pro
			20					25				30			
Thr	Asp	Tyr	Val	Pro	Thr	Val	Phe	Asp	Asn	Phe	Ser	Ala	Asn	Val	Val
		35					40					45			
Val	Asp	Gly	Ser	Thr	Ile	Asn	Leu	Gly	Leu	Trp	Asp	Thr	Ala	Gly	Gln
	50					55					60				
Glu	Asp	Tyr	Asn	Arg	Leu	Arg	Pro	Leu	Ser	Tyr	Arg	Gly	Ala	Asp	Val
	65				70					75				80	
Phe	Leu	Leu	Ala	Phe	Ser	Leu	Ile	Ser	Arg	Ala	Ser	Tyr	Glu	Asn	Ile
			85					90						95	
Ala	Lys	Lys	Trp	Ile	Pro	Glu	Leu	Arg	His	Tyr	Ala	Pro	Gly	Val	Pro
			100					105					110		
Ile	Ile	Leu	Val	Gly	Thr	Lys	Leu	Asp	Leu	Arg	Asp	Asp	Lys	Gln	Phe
		115					120					125			
Phe	Gln	Asp	His	Pro	Gly	Ala	Val	Pro	Ile	Thr	Thr	Ala	Gln	Gly	Glu
		130				135					140				
Glu	Leu	Arg	Lys	Leu	Ile	Gly	Ala	Pro	Val	Tyr	Ile	Glu	Cys	Ser	Ser
		145			150					155				160	
Lys	Thr	Gln	Lys	Asn	Val	Lys	Ala	Val	Phe	Asp	Ala	Ala	Ile	Lys	Val
			165						170					175	
Val	Leu	Gln	Pro	Pro	Lys	Gln	Lys	Lys	Thr	Lys	Arg	Lys	Gly	Gln	Lys
			180					185					190		
Ala	Cys	Ser	Ile	Leu											
		195													

<210> 295

<211> 805

<212> DNA

<213> Wuchereria bancrofti

<220>

<221> CDS

<222> (26)..(601)

<400> 295

cggcagcagc	aagtttgagg	taaag	atg	cag	act	atc	aaa	tgt	gta	gtg	gtt				
			Met	Gln	Thr	Ile	Lys	Cys	Val	Val	Val				52
			1				5								
gga	gat	ggt	gct	gtc	ggc	aaa	aca	tgc	ctt	ctt	att	tcg	tat	act	acc
						15									100
Gly	Asp	Gly	Ala	Val	Gly	Lys	Thr	Cys	Leu	Leu	Ile	Ser	Tyr	Thr	Thr
	10									20				25	
aac	aag	ttt	ccc	agt	gaa	tat	gta	ccc	act	gta	ttt	gac	aat	tat	gct
															148
Asn	Lys	Phe	Pro	Ser	Glu	Tyr	Val	Pro	Thr	Val	Phe	Asp	Asn	Tyr	Ala
			30						35					40	
gta	aca	gta	atg	att	gga	gga	gaa	cca	tat	acg	ctt	ggt	ttg	ttc	gat
															196
Val	Thr	Val	Met	Ile	Gly	Gly	Glu	Pro	Tyr	Thr	Leu	Gly	Leu	Phe	Asp

221/291

45	50	55	
aca gcc ggt caa gag gat tat gat aga ttg cgt cct ctt tca tat ccg			244
Thr Ala Gly Gln Glu Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro			
60	65	70	
caa aca gat gta ttt tta gtg tgc ttt tct gtc gtt gca cct tca tct			292
Gln Thr Asp Val Phe Leu Val Cys Phe Ser Val Val Ala Pro Ser Ser			
75	80	85	
ttc gaa aat gtg aaa gag aag tgg gtg ccg gag ata gca cat cac tgc			340
Phe Glu Asn Val Lys Glu Lys Trp Val Pro Glu Ile Ala His His Cys			
90	95	100	
atg aag aca ccg ttc ctg ctg gtc gga act cag att gat ctt cgt gac			388
Met Lys Thr Pro Phe Leu Leu Val Gly Thr Gln Ile Asp Leu Arg Asp			
110	115	120	
gat cct tcc tac atc gaa aaa ttg gca aaa atc aag caa cga cca att			436
Asp Pro Ser Tyr Ile Glu Lys Leu Ala Lys Ile Lys Gln Arg Pro Ile			
125	130	135	
aca ttc gaa gtt gga gag aag tta gcg aaa gaa tta aag gca gtg aaa			484
Thr Phe Glu Val Gly Glu Lys Leu Ala Lys Glu Leu Lys Ala Val Lys			
140	145	150	
tac gtc gaa tgt tct gca ctc aca cag aaa ggt cta aaa aat gta ttt			532
Tyr Val Glu Cys Ser Ala Leu Thr Gln Lys Gly Leu Lys Asn Val Phe			
155	160	165	
gat gaa gca ata ctg gca gca ttg gaa cca ccg gca cag gag aaa aag			580
Asp Glu Ala Ile Leu Ala Ala Leu Glu Pro Pro Ala Gln Glu Lys Lys			
170	175	180	
aag aaa tgt act ata ctt tagcatcatt gtttctcgat cacgttatat			628
Lys Lys Cys Thr Ile Leu			
190			
tgatttctga tttgttagtc atttatctgt aaatgattat gttaacgtct taaatgctgc			688
acataccatt actacgtccc ctcttctggt tgggccatct gcgcataatgt gtagtggttc			748
catctatgcg atatactgtt agaatgaatg tatttctgtga caaaaaaaaa aaaaaaa			805

<210> 296

<211> 191

<212> PRT

<213> Wuchereria bancrofti

<400> 296

Met Gln Thr Ile Lys Cys Val Val Val Gly Asp Gly Ala Val Gly Lys	
1	5
Thr Cys Leu Leu Ile Ser Tyr Thr Thr Asn Lys Phe Pro Ser Glu Tyr	10
20	25
Val Pro Thr Val Phe Asp Asn Tyr Ala Val Thr Val Met Ile Gly Gly	30
35	40
Glu Pro Tyr Thr Leu Gly Leu Phe Asp Thr Ala Gly Gln Glu Asp Tyr	45
50	55
Asp Arg Leu Arg Pro Leu Ser Tyr Pro Gln Thr Asp Val Phe Leu Val	60
65	70
Cys Phe Ser Val Val Ala Pro Ser Ser Phe Glu Asn Val Lys Glu Lys	75
85	90
Trp Val Pro Glu Ile Ala His His Cys Met Lys Thr Pro Phe Leu Leu	95
100	105
Val Gly Thr Gln Ile Asp Leu Arg Asp Asp Pro Ser Tyr Ile Glu Lys	110
115	120
Leu Ala Lys Ile Lys Gln Arg Pro Ile Thr Phe Glu Val Gly Glu Lys	125
130	135
Leu Ala Lys Glu Leu Lys Ala Val Lys Tyr Val Glu Cys Ser Ala Leu	140
145	150
Thr Gln Lys Gly Leu Lys Asn Val Phe Asp Glu Ala Ile Leu Ala Ala	155
165	170
Leu Glu Pro Pro Ala Gln Glu Lys Lys Lys Lys Cys Thr Ile Leu	175

222/291

180 185 190

<210> 297
 <211> 579
 <212> DNA
 <213> *Emericella nidulans*

<220>
 <221> CDS
 <222> (1)..(579)

<400> 297
 atg gtc gta gca act atc aag tgt gtt gtg gtc ggt gat ggt gct gtc 48
 Met Val Val Ala Thr Ile Lys Cys Val Val Val Gly Asp Gly Ala Val
 1 5 10 15
 ggg aag acc tgt ctc ctg atc tca tac aca acg aac aaa ttc cct tca 96
 Gly Lys Thr Cys Leu Leu Ile Ser Tyr Thr Thr Asn Lys Phe Pro Ser
 20 25 30
 gaa tat gtg ccc acc gtg ttc gat aac tat gct gtg act gtc atg atc 144
 Glu Tyr Val Pro Thr Val Phe Asp Asn Tyr Ala Val Thr Val Met Ile
 35 40 45
 ggc gat gag ccc tac act cta gga tta ttt gat act gct ggt caa gaa 192
 Gly Asp Glu Pro Tyr Thr Leu Gly Leu Phe Asp Thr Ala Gly Gln Glu
 50 55 60
 gat tat gac cga ctt cgt cct ctc tca tac ccg cag aca gat gta ttc 240
 Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Gln Thr Asp Val Phe
 65 70 75 80
 ctt gtc tgc ttt tct gtg acc tcc ccc gca tct ttc gag aac gtg cgc 288
 Leu Val Cys Phe Ser Val Thr Ser Pro Ala Ser Phe Glu Asn Val Arg
 85 90 95
 gaa aag tgg ttc ccc gaa gtt cac cac tgc ccc ggc gtc cca tgc 336
 Glu Lys Trp Phe Pro Glu Val His His His Cys Pro Gly Val Pro Cys
 100 105 110
 ctg att gtt ggg aca caa gtc gat ctc cgg gat gac ccc gcc gtt cgc 384
 Leu Ile Val Gly Thr Gln Val Asp Leu Arg Asp Asp Pro Ala Val Arg
 115 120 125
 gac aag ctg gct cgg caa aag atg caa ccg att cgc aaa gaa gac ggt 432
 Asp Lys Leu Ala Arg Gln Lys Met Gln Pro Ile Arg Lys Glu Asp Gly
 130 135 140
 gac cgc atg gcc aag gat ctg ggc gcc gtg aaa tat gtc gaa tgc tcc 480
 Asp Arg Met Ala Lys Asp Leu Gly Ala Val Lys Tyr Val Glu Cys Ser
 145 150 155 160
 gca ttg acc caa tac aag ctc aag gat gtc ttt gac gag gct att gtt 528
 Ala Leu Thr Gln Tyr Lys Leu Lys Asp Val Phe Asp Glu Ala Ile Val
 165 170 175
 gcg gca ctc gaa ccg gcc cct aag aag agg tgc gtt ctg cta 576
 Ala Ala Leu Glu Pro Ala Pro Lys Lys Arg Ser Arg Cys Val Leu Leu
 180 185 190
 tag 579

<210> 298
 <211> 192
 <212> PRT
 <213> *Emericella nidulans*

<400> 298
 Met Val Val Ala Thr Ile Lys Cys Val Val Val Gly Asp Gly Ala Val
 1 5 10 15
 Gly Lys Thr Cys Leu Leu Ile Ser Tyr Thr Thr Asn Lys Phe Pro Ser
 20 25 30
 Glu Tyr Val Pro Thr Val Phe Asp Asn Tyr Ala Val Thr Val Met Ile
 35 40 45
 Gly Asp Glu Pro Tyr Thr Leu Gly Leu Phe Asp Thr Ala Gly Gln Glu
 50 55 60
 Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Gln Thr Asp Val Phe

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65	70	75	80
Leu Val Cys Phe Ser Val Thr Ser Pro Ala Ser Phe Glu Asn Val Arg			
85	90	95	
Glu Lys Trp Phe Pro Glu Val His His His Cys Pro Gly Val Pro Cys			
100	105	110	
Leu Ile Val Gly Thr Gln Val Asp Leu Arg Asp Asp Pro Ala Val Arg			
115	120	125	
Asp Lys Leu Ala Arg Gln Lys Met Gln Pro Ile Arg Lys Glu Asp Gly			
130	135	140	
Asp Arg Met Ala Lys Asp Leu Gly Ala Val Lys Tyr Val Glu Cys Ser			
145	150	155	160
Ala Leu Thr Gln Tyr Lys Leu Lys Asp Val Phe Asp Glu Ala Ile Val			
165	170	175	
Ala Ala Leu Glu Pro Ala Pro Lys Lys Arg Ser Arg Cys Val Leu Leu			
180	185	190	

<210> 299

<211> 588

<212> DNA

<213> *Drosophila melanogaster*

<220>

<221> CDS

<222> (1) .. (588)

<400> 299

atg tca acc gga agg ccc ata aag tgt gta gtc gtt ggt gac ggc acc	48
Met Ser Thr Gly Arg Pro Ile Lys Cys Val Val Val Gly Asp Gly Thr	
1 5 10 15	
gtc gga aag acc tgc atg cta atc tcc tac acg aca gac tgc ttt ccc	96
Val Gly Lys Thr Cys Met Leu Ile Ser Tyr Thr Thr Asp Cys Phe Pro	
20 25 30	
ggc gaa tat gtg ccc aca gtc ttc gac aac tac tcg gcg ccc atg caa	144
Gly Glu Tyr Val Pro Thr Val Phe Asp Asn Tyr Ser Ala Pro Met Gln	
35 40 45	
gtg gac aca ata cag gtc tcg ctg gga ctg tgg gat acg gcg ggt cag	192
Val Asp Thr Ile Gln Val Ser Leu Gly Leu Trp Asp Thr Ala Gly Gln	
50 55 60	
gag gac tac gac cgc ctg aga ccg cta tcc tac ccg cag aca gac gtt	240
Glu Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Gln Thr Asp Val	
65 70 75 80	
ttc ctg ata tgc tac agc gtg gcg agt ccc tcg tcc ttt gag aac gtc	288
Phe Leu Ile Cys Tyr Ser Val Ala Ser Pro Ser Ser Phe Glu Asn Val	
85 90 95	
acc tcg aaa tgg tat ccg gag ata aag cac cac tgt ccc gat gcg ccc	336
Thr Ser Lys Trp Tyr Pro Glu Ile Lys His His Cys Pro Asp Ala Pro	
100 105 110	
atc att cta gtt ggc acc aaa atc gat ttg cgc gaa gat cga gag aca	384
Ile Ile Leu Val Gly Thr Lys Ile Asp Leu Arg Glu Asp Arg Glu Thr	
115 120 125	
ctc agc ggc ctg gca gag cag gga ctg acg ccg ctg aag cgc gag cag	432
Leu Ser Gly Leu Ala Glu Gln Gly Leu Thr Pro Leu Lys Arg Glu Gln	
130 135 140	
ggc cag aag ctg gca aac aag ata cgc gct gtg aaa tac atg gag tgc	480
Gly Gln Lys Leu Ala Asn Lys Ile Arg Ala Val Lys Tyr Met Glu Cys	
145 150 155 160	
tcc gcc ttg acg cag cgc ggt ctc aag ccg gtg ttc gag gaa gcg gtg	528
Ser Ala Leu Thr Gln Arg Gly Leu Lys Pro Val Phe Glu Glu Ala Val	
165 170 175	
cgc gcg gtg ctc aga cca gag ccg cta aag cga cgc cag cga aag tgt	576
Arg Ala Val Leu Arg Pro Glu Pro Leu Lys Arg Arg Gln Arg Lys Cys	
180 185 190	
tta ata atg taa	588
Leu Ile Met	
195	

<210> 300

<211> 195
 <212> PRT
 <213> *Drosophila melanogaster*

<400> 300

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Met Ser Thr Gly Arg Pro Ile Lys Cys Val Val Val Gly Asp Gly Thr
1          5          10          15
Val Gly Lys Thr Cys Met Leu Ile Ser Tyr Thr Thr Asp Cys Phe Pro
          20          25          30
Gly Glu Tyr Val Pro Thr Val Phe Asp Asn Tyr Ser Ala Pro Met Gln
          35          40          45
Val Asp Thr Ile Gln Val Ser Leu Gly Leu Trp Asp Thr Ala Gly Gln
          50          55          60
Glu Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Gln Thr Asp Val
65          70          75          80
Phe Leu Ile Cys Tyr Ser Val Ala Ser Pro Ser Ser Phe Glu Asn Val
          85          90          95
Thr Ser Lys Trp Tyr Pro Glu Ile Lys His His Cys Pro Asp Ala Pro
          100          105          110
Ile Ile Leu Val Gly Thr Lys Ile Asp Leu Arg Glu Asp Arg Glu Thr
          115          120          125
Leu Ser Gly Leu Ala Glu Gln Gly Leu Thr Pro Leu Lys Arg Glu Gln
          130          135          140
Gly Gln Lys Leu Ala Asn Lys Ile Arg Ala Val Lys Tyr Met Glu Cys
145          150          155          160
Ser Ala Leu Thr Gln Arg Gly Leu Lys Pro Val Phe Glu Glu Ala Val
          165          170          175
Arg Ala Val Leu Arg Pro Glu Pro Leu Lys Arg Arg Gln Arg Lys Cys
          180          185          190
Leu Ile Met
          195
  
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<210> 301
 <211> 582
 <212> DNA
 <213> *Xenopus laevis*

<220>
 <221> CDS
 <222> (1) .. (582)

<400> 301

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atg gca gcc att cgt aag aag ctc gta att gtt gga gat ggt gca tgc      48
Met Ala Ala Ile Arg Lys Lys Leu Val Ile Val Gly Asp Gly Ala Cys
1          5          10          15
ggg aaa acc tgc ctt ctg att gtg ttc agt aaa gac cag ttt cca gaa      96
Gly Lys Thr Cys Leu Leu Ile Val Phe Ser Lys Asp Gln Phe Pro Glu
          20          25          30
gtg tat gtc cca aca gtt ttt gag aac tat gtg gca gac ata gaa gtg      144
Val Tyr Val Pro Thr Val Phe Glu Asn Tyr Val Ala Asp Ile Glu Val
          35          40          45
gat ggc aag cag gtt gag ttg gcc cta tgg gat aca gct ggt caa gaa      192
Asp Gly Lys Gln Val Glu Leu Ala Leu Trp Asp Thr Ala Gly Gln Glu
          50          55          60
gat tat gac aga ctg cga cct ctg tcc tat cca gac act gat gtt ata      240
Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Asp Thr Asp Val Ile
65          70          75          80
tta atg tgc ttt tcc att gat agc ccc gac agt tta gaa aac ata cct      288
Leu Met Cys Phe Ser Ile Asp Ser Pro Asp Ser Leu Glu Asn Ile Pro
          85          90          95
gag aaa tgg acc ccg gag gtg aaa cat ttc tgc ccc aat gtg ccc att      336
Glu Lys Trp Thr Pro Glu Val Lys His Phe Cys Pro Asn Val Pro Ile
          100          105          110
att tta gtt gga aac aag aag gat ctg cgt aat gat gaa cac act cgt      384
Ile Leu Val Gly Asn Lys Lys Asp Leu Arg Asn Asp Glu His Thr Arg
          115          120          125
agg gag ctc acc aaa atg aaa cag gag cct gtg aag ccc gaa gaa ggt      432
Arg Glu Leu Thr Lys Met Lys Gln Glu Pro Val Lys Pro Glu Glu Gly
  
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225/291

130	135	140	
cgt gac atg gca aac cgt atc tcc gcc tac gcg tac atg gaa tgc tct			480
Arg Asp Met Ala Asn Arg Ile Ser Ala Tyr Ala Tyr Met Glu Cys Ser			
145	150	155	160
gca aaa acg aaa gat ggc gtg agg gaa gtg ttt gag ctg gct aca cgg			528
Ala Lys Thr Lys Asp Gly Val Arg Glu Val Phe Glu Leu Ala Thr Arg			
	165	170	175
gca gcc ctg caa gct agg cgt ggc aag aag aaa cca cgt tgc ctt ctc			576
Ala Ala Leu Gln Ala Arg Arg Gly Lys Lys Lys Pro Arg Cys Leu Leu			
	180	185	190
atc taa			582
Ile			

<210> 302

<211> 193

<212> PRT

<213> *Xenopus laevis*

<400> 302

Met Ala Ala Ile Arg Lys Lys Leu Val Ile Val Gly Asp Gly Ala Cys	
1 5 10 15	
Gly Lys Thr Cys Leu Leu Ile Val Phe Ser Lys Asp Gln Phe Pro Glu	
20 25 30	
Val Tyr Val Pro Thr Val Phe Glu Asn Tyr Val Ala Asp Ile Glu Val	
35 40 45	
Asp Gly Lys Gln Val Glu Leu Ala Leu Trp Asp Thr Ala Gly Gln Glu	
50 55 60	
Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Asp Thr Asp Val Ile	
65 70 75 80	
Leu Met Cys Phe Ser Ile Asp Ser Pro Asp Ser Leu Glu Asn Ile Pro	
85 90 95	
Glu Lys Trp Thr Pro Glu Val Lys His Phe Cys Pro Asn Val Pro Ile	
100 105 110	
Ile Leu Val Gly Asn Lys Lys Asp Leu Arg Asn Asp Glu His Thr Arg	
115 120 125	
Arg Glu Leu Thr Lys Met Lys Gln Glu Pro Val Lys Pro Glu Glu Gly	
130 135 140	
Arg Asp Met Ala Asn Arg Ile Ser Ala Tyr Ala Tyr Met Glu Cys Ser	
145 150 155 160	
Ala Lys Thr Lys Asp Gly Val Arg Glu Val Phe Glu Leu Ala Thr Arg	
165 170 175	
Ala Ala Leu Gln Ala Arg Arg Gly Lys Lys Lys Pro Arg Cys Leu Leu	
180 185 190	
Ile	

<210> 303

<211> 591

<212> DNA

<213> *Physcomitrella patens*

<220>

<221> CDS

<222> (1)..(591)

<400> 303

atg agc act tca cgg ttt atc aag tgc gtg act gtt gga gat gga gct	48
Met Ser Thr Ser Arg Phe Ile Lys Cys Val Thr Val Gly Asp Gly Ala	
1 5 10 15	
gtc ggg aag acg tgc atg ctt att tca tac acc agc aac aca ttt cct	96
Val Gly Lys Thr Cys Met Leu Ile Ser Tyr Thr Ser Asn Thr Phe Pro	
20 25 30	
act gat tac gtt cct acc gtg ttt gac aac ttc agc gca aat gta gtg	144
Thr Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val Val	
35 40 45	
gtc gat gga aat acc gtc aac ctc ggg tta tgg gat aca gca ggt caa	192

226/291

Val	Asp	Gly	Asn	Thr	Val	Asn	Leu	Gly	Leu	Trp	Asp	Thr	Ala	Gly	Gln		
50					55					60							
gaa	gat	tac	aac	agg	ctt	cgt	cct	ctg	agt	tac	agg	ggt	gct	gat	gtt		240
Glu	Asp	Tyr	Asn	Arg	Leu	Arg	Pro	Leu	Ser	Tyr	Arg	Gly	Ala	Asp	Val		
65					70					75					80		
ttt	ctc	ctg	gcg	ttc	tcc	ctc	atc	agc	aag	gct	agt	tat	gaa	aac	ata		288
Phe	Leu	Leu	Ala	Phe	Ser	Leu	Ile	Ser	Lys	Ala	Ser	Tyr	Glu	Asn	Ile		
				85					90					95			
tca	aag	aag	tgg	atc	ccg	gaa	ctg	aga	cat	tac	gcg	cca	tct	gtg	cca		336
Ser	Lys	Lys	Trp	Ile	Pro	Glu	Leu	Arg	His	Tyr	Ala	Pro	Ser	Val	Pro		
			100					105					110				
atc	att	ctc	gtc	gga	aca	aaa	ctt	gat	ctt	cgc	gat	gac	aaa	caa	ttc		384
Ile	Ile	Leu	Val	Gly	Thr	Lys	Leu	Asp	Leu	Arg	Asp	Asp	Lys	Gln	Phe		
		115					120					125					
ttt	gct	gat	cat	cct	gga	gcg	gct	cca	ata	act	act	tct	caa	ggg	gag		432
Phe	Ala	Asp	His	Pro	Gly	Ala	Ala	Pro	Ile	Thr	Thr	Ser	Gln	Gly	Glu		
	130					135					140						
gag	ctc	agg	aag	tcg	att	ggg	gcg	gcc	tcg	tac	ata	gag	tgc	agc	tca		480
Glu	Leu	Arg	Lys	Ser	Ile	Gly	Ala	Ala	Ser	Tyr	Ile	Glu	Cys	Ser	Ser		
145					150					155					160		
aag	act	cag	cag	aat	gta	aaa	gca	gtt	ttt	gac	gca	gca	atc	aag	gtg		528
Lys	Thr	Gln	Gln	Asn	Val	Lys	Ala	Val	Phe	Asp	Ala	Ala	Ile	Lys	Val		
				165					170					175			
gtt	ctc	caa	cca	cca	aag	cag	aag	aag	aag	aag	aaa	aaa	caa	aag	aat		576
Val	Leu	Gln	Pro	Pro	Lys	Gln	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Gln	Lys	Asn	
			180				185						190				
tgc	gtc	att	ctg	tga													591
Cys	Val	Ile	Leu														
		195															

<210> 304

<211> 196

<212> PRT

<213> Physcomitrella patens

<400> 304

Met	Ser	Thr	Ser	Arg	Phe	Ile	Lys	Cys	Val	Thr	Val	Gly	Asp	Gly	Ala		
1				5					10					15			
Val	Gly	Lys	Thr	Cys	Met	Leu	Ile	Ser	Tyr	Thr	Ser	Asn	Thr	Phe	Pro		
			20					25					30				
Thr	Asp	Tyr	Val	Pro	Thr	Val	Phe	Asp	Asn	Phe	Ser	Ala	Asn	Val	Val		
		35				40						45					
Val	Asp	Gly	Asn	Thr	Val	Asn	Leu	Gly	Leu	Trp	Asp	Thr	Ala	Gly	Gln		
	50					55				60							
Glu	Asp	Tyr	Asn	Arg	Leu	Arg	Pro	Leu	Ser	Tyr	Arg	Gly	Ala	Asp	Val		
65				70						75					80		
Phe	Leu	Leu	Ala	Phe	Ser	Leu	Ile	Ser	Lys	Ala	Ser	Tyr	Glu	Asn	Ile		
				85					90					95			
Ser	Lys	Lys	Trp	Ile	Pro	Glu	Leu	Arg	His	Tyr	Ala	Pro	Ser	Val	Pro		
			100					105					110				
Ile	Ile	Leu	Val	Gly	Thr	Lys	Leu	Asp	Leu	Arg	Asp	Asp	Lys	Gln	Phe		
		115					120					125					
Phe	Ala	Asp	His	Pro	Gly	Ala	Ala	Pro	Ile	Thr	Thr	Ser	Gln	Gly	Glu		
	130					135					140						
Glu	Leu	Arg	Lys	Ser	Ile	Gly	Ala	Ala	Ser	Tyr	Ile	Glu	Cys	Ser	Ser		
145					150					155					160		
Lys	Thr	Gln	Gln	Asn	Val	Lys	Ala	Val	Phe	Asp	Ala	Ala	Ile	Lys	Val		
			165						170					175			
Val	Leu	Gln	Pro	Pro	Lys	Gln	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Gln	Lys	Asn	
			180				185							190			
Cys	Val	Ile	Leu														
		195															

<210> 305

<211> 841

<212> DNA

<213> Schistosoma mansoni

<220>

<221> CDS

<222> (7)...(588)

<400> 305

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gcaaca atg gcg agt gcg gta cgt aag aaa ctt gtt att gtt gga gat      48
      Met Ala Ser Ala Val Arg Lys Lys Leu Val Ile Val Gly Asp
      1      5      10
ggt gca tgc ggg aaa act tgt tta ctt att gta ttc agc aaa gac cag      96
Gly Ala Cys Gly Lys Thr Cys Leu Leu Ile Val Phe Ser Lys Asp Gln
15      20      25      30
ttt ccc gaa gtt tac gtt cct act gta ttc gaa aac tat gtt gca gat      144
Phe Pro Glu Val Tyr Val Pro Thr Val Phe Glu Asn Tyr Val Ala Asp
      35      40      45
atc gaa gtt gat aac aga caa gtt gaa tta gct ctc tgg gac act gct      192
Ile Glu Val Asp Asn Arg Gln Val Glu Leu Ala Leu Trp Asp Thr Ala
      50      55      60
ggc caa gaa gat tat gat agg cta cgg cca ctt tct tat cct gat acg      240
Gly Gln Glu Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Asp Thr
      65      70      75
gat gta gtt ctg tta tgt tat agt att gac tct ccc gat agt ttt gca      288
Asp Val Val Leu Leu Cys Tyr Ser Ile Asp Ser Pro Asp Ser Phe Ala
      80      85      90
aac att gag gaa aaa tgg tta cca gaa atc cgt cat ttt tgt cct gat      336
Asn Ile Glu Glu Lys Trp Leu Pro Glu Ile Arg His Phe Cys Pro Asp
95      100      105      110
gtt ccc att gtc tta gtt gga aac aaa aaa gac tta cga cat gac gag      384
Val Pro Ile Val Leu Val Gly Asn Lys Lys Asp Leu Arg His Asp Glu
      115      120      125
gct aca aag aat gag cta cac aga acc aaa caa ctt cct gtc act ttt      432
Ala Thr Lys Asn Glu Leu His Arg Thr Lys Gln Leu Pro Val Thr Phe
      130      135      140
aac gag ggt aaa caa gta gct gaa aag att tct gct tat gcc ttc ttt      480
Asn Glu Gly Lys Gln Val Ala Glu Lys Ile Ser Ala Tyr Ala Phe Phe
      145      150      155
gag tgt tca gct aag acc aag gaa gga gtc agc gat gtt ttc gta gca      528
Glu Cys Ser Ala Lys Thr Lys Glu Gly Val Ser Asp Val Phe Val Ala
      160      165      170
gct act cga gcc gcc ttg aat tca gcg aag aag aag agg agg agg tgt      576
Ala Thr Arg Ala Ala Leu Asn Ser Ala Lys Lys Lys Arg Arg Arg Cys
      175      180      185      190
gat tta att tgatctccac tggtctctaa attgtctaga tttgattttc cgtctccga      635
Asp Leu Ile

aacatacatt cccctcctaa ttcttctca ggaccttaaa ttgctacttc tatcggctgc      695

gtgttttcttt tacaatcata ttttttgttt gccacaaga caatccattc cacggaaata      755

tttgccattt atttttgctt tgggtactaaa atagggcatg cctcatgtaa cttatatatta      815

ttgagaataa attactataa tcagtc      841

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<210> 306

<211> 193

<212> PRT

<213> Schistosoma mansoni

<400> 306

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Met Ala Ser Ala Val Arg Lys Lys Leu Val Ile Val Gly Asp Gly Ala
1      5      10      15
Cys Gly Lys Thr Cys Leu Leu Ile Val Phe Ser Lys Asp Gln Phe Pro

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	20		25		30
Glu Val Tyr Val Pro Thr Val Phe Glu Asn Tyr Val Ala Asp Ile Glu					
Val Asp Asn Arg Gln Val Glu Leu Ala Leu Trp Asp Thr Ala Gly Gln	35	40	45		
Glu Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Asp Thr Asp Val	50	55	60		
Val Leu Leu Cys Tyr Ser Ile Asp Ser Pro Asp Ser Phe Ala Asn Ile	65	70	75	80	
Glu Glu Lys Trp Leu Pro Glu Ile Arg His Phe Cys Pro Asp Val Pro	85	90	95		
Ile Val Leu Val Gly Asn Lys Lys Asp Leu Arg His Asp Glu Ala Thr	100	105	110		
Lys Asn Glu Leu His Arg Thr Lys Gln Leu Pro Val Thr Phe Asn Glu	115	120	125		
Gly Lys Gln Val Ala Glu Lys Ile Ser Ala Tyr Ala Phe Phe Glu Cys	130	135	140		
Ser Ala Lys Thr Lys Glu Gly Val Ser Asp Val Phe Val Ala Ala Thr	145	150	155	160	
Arg Ala Ala Leu Asn Ser Ala Lys Lys Arg Arg Arg Cys Asp Leu	165	170	175		
Ile	180	185	190		

<210> 307

<211> 576

<212> DNA

<213> Gallus gallus

<220>

<221> CDS

<222> (1)..(576)

<400> 307

atg cag acg att aag tgt gta gtt gtg ggt gat ggt gct gtt ggt aaa	48
Met Gln Thr Ile Lys Cys Val Val Val Gly Asp Gly Ala Val Gly Lys	
1 5 10 15	
acc tgt ctc tta att tct tac aca aca aat aaa ttt cca tcg gaa tac	96
Thr Cys Leu Leu Ile Ser Tyr Thr Thr Asn Lys Phe Pro Ser Glu Tyr	
20 25 30	
gta cca acg gtt ttt gat aac tat gct gta aca gtg atg att gga gga	144
Val Pro Thr Val Phe Asp Asn Tyr Ala Val Thr Val Met Ile Gly Gly	
35 40 45	
gag cct tac act cta ggc ctc ttt gat act gca ggt cag gaa gat tat	192
Glu Pro Tyr Thr Leu Gly Leu Phe Asp Thr Ala Gly Gln Glu Asp Tyr	
50 55 60	
gat aga tta cga ccc ctc agc tat cca cag aca gat gta ttt ctg gtc	240
Asp Arg Leu Arg Pro Leu Ser Tyr Pro Gln Thr Asp Val Phe Leu Val	
65 70 75 80	
tgt ttt tca gtg gta tct cct tct tca ttt gaa aat gtg aaa gaa aag	288
Cys Phe Ser Val Val Ser Pro Ser Ser Phe Glu Asn Val Lys Glu Lys	
85 90 95	
tgg gta cct gaa att act cac cat tgt cca aag act cct ttt ctg ctt	336
Trp Val Pro Glu Ile Thr His His Cys Pro Lys Thr Pro Phe Leu Leu	
100 105 110	
gtt ggg acc caa att gat cta aga gat gat ccc tca aca att gaa aaa	384
Val Gly Thr Gln Ile Asp Leu Arg Asp Asp Pro Ser Thr Ile Glu Lys	
115 120 125	
ctt gcc aag aac aag cag aag ccc ata act cca gag acg gct gaa aaa	432
Leu Ala Lys Asn Lys Gln Lys Pro Ile Thr Pro Glu Thr Ala Glu Lys	
130 135 140	
ctg gcc cgg gac ctg aag gct gtt aaa tat gtg gaa tgc tct gcg ctt	480
Leu Ala Arg Asp Leu Lys Ala Val Lys Tyr Val Glu Cys Ser Ala Leu	
145 150 155 160	
acg cag aaa ggc cta aag aat gta ttt gat gag gcg ata ttg gct gcc	528
Thr Gln Lys Gly Leu Lys Asn Val Phe Asp Glu Ala Ile Leu Ala Ala	
165 170 175	
ctg gag cct ccg gag ccg aag aag act cgc agg tgt gtg ctg cta	573

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Leu Glu Pro Pro Glu Pro Lys Lys Thr Arg Arg Cys Val Leu Leu
 180 185 190
 tga

576

<210> 308
 <211> 191
 <212> PRT
 <213> Gallus gallus

<400> 308
 Met Gln Thr Ile Lys Cys Val Val Val Gly Asp Gly Ala Val Gly Lys
 1 5 10 15
 Thr Cys Leu Leu Ile Ser Tyr Thr Thr Asn Lys Phe Pro Ser Glu Tyr
 20 25 30
 Val Pro Thr Val Phe Asp Asn Tyr Ala Val Thr Val Met Ile Gly Gly
 35 40 45
 Glu Pro Tyr Thr Leu Gly Leu Phe Asp Thr Ala Gly Gln Glu Asp Tyr
 50 55 60
 Asp Arg Leu Arg Pro Leu Ser Tyr Pro Gln Thr Asp Val Phe Leu Val
 65 70 75 80
 Cys Phe Ser Val Val Ser Pro Ser Ser Phe Glu Asn Val Lys Glu Lys
 85 90 95
 Trp Val Pro Glu Ile Thr His His Cys Pro Lys Thr Pro Phe Leu Leu
 100 105 110
 Val Gly Thr Gln Ile Asp Leu Arg Asp Asp Pro Ser Thr Ile Glu Lys
 115 120 125
 Leu Ala Lys Asn Lys Gln Lys Pro Ile Thr Pro Glu Thr Ala Glu Lys
 130 135 140
 Leu Ala Arg Asp Leu Lys Ala Val Lys Tyr Val Glu Cys Ser Ala Leu
 145 150 155 160
 Thr Gln Lys Gly Leu Lys Asn Val Phe Asp Glu Ala Ile Leu Ala Ala
 165 170 175
 Leu Glu Pro Pro Glu Pro Lys Lys Thr Arg Arg Cys Val Leu Leu
 180 185 190

<210> 309
 <211> 2011
 <212> DNA
 <213> Candida albicans

<220>
 <221> CDS
 <222> (540)..(1580)

<400> 309
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 tagttcacaa tacgctatga cgagcatcta aactatgtca atatctgaaa aggctaattt 120
 tttgttttgt tttaaagcac tttgtgattt taaggatatt ttccttaaatt attattttta 180
 gaaataaata cagggacgac tgattggaaa taataaaaca taaacactgc ccatttcagg 240
 cacgcaaaaa aacaaaaaaaa ccgtgccctt ttctttttca tgttttcctt tcccgatttt 300
 ttctctctct ctttatttct ttctctctag atttttttta ctgatctcac actatcacca 360
 catatacaca ctcacacatt atataatctt caattataac tcactctgggt tctaacagtt 420

tctttttttt tctaacttgc ttttttttta ataaagtttc tataatttcg atacaccaat 480

 tttgttttca ctatttagtt attgtaacgt tctagtttga aaatccattt ctataagat 539

 atg aca ccc aac ggc agt agg aga cat tcg gcg tac atg ggg tcg ccc 587
 Met Thr Pro Asn Gly Ser Arg Arg His Ser Ala Tyr Met Gly Ser Pro
 1 5 10 15
 aga agc cag cat agt tcc aca atg gaa aca ggt tac aat cct tac gaa 635
 Arg Ser Gln His Ser Ser Thr Met Glu Thr Gly Tyr Asn Pro Tyr Glu
 20 25 30
 gca gta cag aag aaa cag gaa tta tac caa aat aac aac ggc aat tca 683
 Ala Val Gln Lys Lys Gln Glu Leu Tyr Gln Asn Asn Asn Gly Asn Ser
 35 40 45
 cca acc gtc atc att gaa gaa gat cca tac atc cca aat tat aaa gag 731
 Pro Thr Val Ile Ile Glu Glu Asp Pro Tyr Ile Pro Asn Tyr Lys Glu
 50 55 60
 ctg tct cta gca aat aag aaa aca aat tat aac atg aaa att gtc gtt 779
 Leu Ser Leu Ala Asn Lys Lys Thr Asn Tyr Asn Met Lys Ile Val Val
 65 70 75 80
 gtc ggt gac ggt ggg tgt ggt aag acg tgt tta tta gca tac aca 827
 Val Gly Asp Gly Cys Gly Lys Thr Cys Leu Leu Leu Ala Tyr Thr
 85 90 95
 caa aac aaa ttt cct tca atc tat gtt ccc aca gtt ttt gag aat tat 875
 Gln Asn Lys Phe Pro Ser Ile Tyr Val Pro Thr Val Phe Glu Asn Tyr
 100 105 110
 gtg acg gca gta cag tcg cct aat ggt aaa acc gtg gaa ttg gct ctc 923
 Val Thr Ala Val Gln Ser Pro Asn Gly Lys Thr Val Glu Leu Ala Leu
 115 120 125
 tgg gat act gct ggc caa gaa gaa tac gat agg tta cga cca cta agc 971
 Trp Asp Thr Ala Gly Gln Glu Glu Tyr Asp Arg Leu Arg Pro Leu Ser
 130 135 140
 tat cct gac gtt gat att tta ttg gtg tgt ttt gcc gtg gac aat gaa 1019
 Tyr Pro Asp Val Asp Ile Leu Leu Val Cys Phe Ala Val Asp Asn Glu
 145 150 155 160
 gtt agt ttg gag aat gtc aag gat atg tgg ttc ccc gaa gtg aat cat 1067
 Val Ser Leu Glu Asn Val Lys Asp Met Trp Phe Pro Glu Val Asn His
 165 170 175
 tat tgt cct ggt att ccc att att ttg gtt ggt acc aag agt gat tta 1115
 Tyr Cys Pro Gly Ile Pro Ile Ile Leu Val Gly Thr Lys Ser Asp Leu
 180 185 190
 ctg tct gat atg aat cac gat gca tca ata cga gta gcc aaa gaa att 1163
 Leu Ser Asp Met Asn His Asp Ala Ser Ile Arg Val Ala Lys Glu Ile
 195 200 205
 ggc gcc att gga ttg att ttc aca tca gcc aag acc atg ttc aat gta 1211
 Gly Ala Ile Gly Leu Ile Phe Thr Ser Ala Lys Thr Met Phe Asn Val
 210 215 220
 cgg act gtt ttt aat ttt gca tta aac cat ttt caa aga aat atg gaa 1259
 Arg Thr Val Phe Asn Phe Ala Leu Asn His Phe Gln Arg Asn Met Glu
 225 230 235 240
 ttg cag gaa caa tat gaa aag aca ttg ggt tca aga aag aga ata agt 1307
 Leu Gln Glu Gln Tyr Glu Lys Thr Leu Gly Ser Arg Lys Arg Ile Ser
 245 250 255
 aga gta ttg ggt ggt agt aat gga ggc agt ggg aac cat tcc aga cat 1355
 Arg Val Leu Gly Gly Ser Asn Gly Gly Ser Gly Asn His Ser Arg His
 260 265 270
 cat tct aga aac tac tcc aac gtt tcg aac aac aga agg ggc cat ttg 1403
 His Ser Arg Asn Tyr Ser Asn Val Ser Asn Asn Arg Arg Gly His Leu
 275 280 285
 aag aac aca tca tac gat tcc acg gca ttg ttg gat caa ccg ttg aca 1451
 Lys Asn Thr Ser Tyr Asp Ser Thr Ala Leu Leu Asp Gln Pro Leu Thr
 290 295 300
 gaa gac acc tat gtg aaa aat cct tat ggg aac ttt ggc tat aaa gca 1499
 Glu Asp Thr Tyr Val Lys Asn Pro Tyr Gly Asn Phe Gly Tyr Lys Ala
 305 310 315 320
 aat gtt gaa agt ccg tat aat cag gat gag ttt gca ttt aca aga gaa 1547

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Asn Val Glu Ser Pro Tyr Asn Gln Asp Glu Phe Ala Phe Thr Arg Glu
 325 330 335
 aga aag aag aag aaa aag tgt gta ata ttg tagatacctc tttgattagg 1597
 Arg Lys Lys Lys Lys Lys Cys Val Ile Leu
 340 345
 tccataataa tatattaaag ttctgcatat gacaagaaat cgtttttag aaagcacatg 1657
 aaatcatgtc acaattgcat ggctagttaa caggtctctg gatttcgaat tggatgaaag 1717
 tataattata aaaccaatta gtgtctggga atactacata actgtctact gagatttcct 1777
 atagtgagat atctaactgg tcaaagtgtg gtacttttga agtgatattg ggttacttgc 1837
 tgtatatatc gtcaatgttc cgtttatcct tcttatccga gactagtata gcaattatta 1897
 tcattaatcc ttaacaaatg aacaggctcc agcttgctga aaaaacactg ggcacttcat 1957
 cattttgtag tggtaaactct ttatattggt ttccaatatt atagatcctc taga 2011

<210> 310

<211> 346

<212> PRT

<213> Candida albicans

<400> 310

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 1 5 10 15
 Arg Ser Gln His Ser Ser Thr Met Glu Thr Gly Tyr Asn Pro Tyr Glu
 20 25 30
 Ala Val Gln Lys Lys Gln Glu Leu Tyr Gln Asn Asn Asn Gly Asn Ser
 35 40 45
 Pro Thr Val Ile Ile Glu Glu Asp Pro Tyr Ile Pro Asn Tyr Lys Glu
 50 55 60
 Leu Ser Leu Ala Asn Lys Lys Thr Asn Tyr Asn Met Lys Ile Val Val
 65 70 75 80
 Val Gly Asp Gly Gly Cys Gly Lys Thr Cys Leu Leu Leu Ala Tyr Thr
 85 90 95
 Gln Asn Lys Phe Pro Ser Ile Tyr Val Pro Thr Val Phe Glu Asn Tyr
 100 105 110
 Val Thr Ala Val Gln Ser Pro Asn Gly Lys Thr Val Glu Leu Ala Leu
 115 120 125
 Trp Asp Thr Ala Gly Gln Glu Glu Tyr Asp Arg Leu Arg Pro Leu Ser
 130 135 140
 Tyr Pro Asp Val Asp Ile Leu Leu Val Cys Phe Ala Val Asp Asn Glu
 145 150 155 160
 Val Ser Leu Glu Asn Val Lys Asp Met Trp Phe Pro Glu Val Asn His
 165 170 175
 Tyr Cys Pro Gly Ile Pro Ile Ile Leu Val Gly Thr Lys Ser Asp Leu
 180 185 190
 Leu Ser Asp Met Asn His Asp Ala Ser Ile Arg Val Ala Lys Glu Ile
 195 200 205
 Gly Ala Ile Gly Leu Ile Phe Thr Ser Ala Lys Thr Met Phe Asn Val
 210 215 220
 Arg Thr Val Phe Asn Phe Ala Leu Asn His Phe Gln Arg Asn Met Glu
 225 230 235 240
 Leu Gln Glu Gln Tyr Glu Lys Thr Leu Gly Ser Arg Lys Arg Ile Ser
 245 250 255
 Arg Val Leu Gly Gly Ser Asn Gly Gly Ser Gly Asn His Ser Arg His
 260 265 270

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His Ser Arg Asn Tyr Ser Asn Val Ser Asn Asn Arg Arg Gly His Leu
 275 280 285
 Lys Asn Thr Ser Tyr Asp Ser Thr Ala Leu Leu Asp Gln Pro Leu Thr
 290 295 300
 Glu Asp Thr Tyr Val Lys Asn Pro Tyr Gly Asn Phe Gly Tyr Lys Ala
 305 310 315 320
 Asn Val Glu Ser Pro Tyr Asn Gln Asp Glu Phe Ala Phe Thr Arg Glu
 325 330 335
 Arg Lys Lys Lys Lys Lys Cys Val Ile Leu
 340 345

<210> 311

<211> 710

<212> DNA

<213> Beta vulgaris

<220>

<221> CDS

<222> (91)..(684)

<400> 311

ttgattgatc aagaggagaa gagagagtga gaggttggtt gaatagaaga tcgtagata 60

tttttttttt taattttttt tgttaaaaaa atg agt gct tcg agg ttc ata aaa 114
 Met Ser Ala Ser Arg Phe Ile Lys

1 5
 tgt gtt aca gtt ggt gat ggt gcc gtt ggt aaa act tgc ttg ttg att 162
 Cys Val Thr Val Gly Asp Gly Ala Val Gly Lys Thr Cys Leu Leu Ile

10 15 20
 tct tac acc agc aac acc ttt cct acg gac tac gtg ccc act gtt ttt 210
 Ser Tyr Thr Ser Asn Thr Phe Pro Thr Asp Tyr Val Pro Thr Val Phe

25 30 35 40
 gac aat ttc agt gcc aat gtc gtc gtt aac ggg gcc aca gtt aat ctg 258
 Asp Asn Phe Ser Ala Asn Val Val Val Asn Gly Ala Thr Val Asn Leu

45 50 55
 gga tta tgg gat act gca gga caa gag gat tat aac aga tta aga cct 306
 Gly Leu Trp Asp Thr Ala Gly Gln Glu Asp Tyr Asn Arg Leu Arg Pro

60 65 70
 ttg agt tat cgt gga gca gat gtt ttt att ctc gct ttc tcc ctt att 354
 Leu Ser Tyr Arg Gly Ala Asp Val Phe Ile Leu Ala Phe Ser Leu Ile

75 80 85
 agc aag gct agt tat gaa aat gtt tct aag aag tgg att cct gag ttg 402
 Ser Lys Ala Ser Tyr Glu Asn Val Ser Lys Lys Trp Ile Pro Glu Leu

90 95 100
 aag cat tat gct cct ggt gtc ccc att gtt ctt gtt gga aca aag ctc 450
 Lys His Tyr Ala Pro Gly Val Pro Ile Val Leu Val Gly Thr Lys Leu

105 110 115 120
 gat ctt cgg gat gac aag cag ttt ttt atc gac cac cct ggt gca gtt 498
 Asp Leu Arg Asp Asp Lys Gln Phe Phe Ile Asp His Pro Gly Ala Val

125 130 135
 cca atc act aca gct cag gga gag gaa tta agg aaa ctg att ggg gct 546
 Pro Ile Thr Thr Ala Gln Gly Glu Glu Leu Arg Lys Leu Ile Gly Ala

140 145 150
 cct gct tac atc gaa tgc agt tca aaa aca cag cag aat gtc aag gca 594
 Pro Ala Tyr Ile Glu Cys Ser Ser Lys Thr Gln Gln Asn Val Lys Ala

155 160 165
 gtt ttt gat gca gcc att aag gtc gtg ctt caa cca cca aag aca aag 642
 Val Phe Asp Ala Ala Ile Lys Val Val Leu Gln Pro Pro Lys Thr Lys

170 175 180
 aaa aag aag tca aag gca cag aag gct tgc tcc ata ttg taattgtgta 691
 Lys Lys Lys Ser Lys Ala Gln Lys Ala Cys Ser Ile Leu

185 190 195
 agttgtaaag agaaacaag 710

<210> 312
 <211> 197
 <212> PRT
 <213> Beta vulgaris

<400> 312
 Met Ser Ala Ser Arg Phe Ile Lys Cys Val Thr Val Gly Asp Gly Ala
 1 5 10 15
 Val Gly Lys Thr Cys Leu Leu Ile Ser Tyr Thr Ser Asn Thr Phe Pro
 20 25 30
 Thr Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val Val
 35 40 45
 Val Asn Gly Ala Thr Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln
 50 55 60
 Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp Val
 65 70 75 80
 Phe Ile Leu Ala Phe Ser Leu Ile Ser Lys Ala Ser Tyr Glu Asn Val
 85 90 95
 Ser Lys Lys Trp Ile Pro Glu Leu Lys His Tyr Ala Pro Gly Val Pro
 100 105 110
 Ile Val Leu Val Gly Thr Lys Leu Asp Leu Arg Asp Asp Lys Gln Phe
 115 120 125
 Phe Ile Asp His Pro Gly Ala Val Pro Ile Thr Thr Ala Gln Gly Glu
 130 135 140
 Glu Leu Arg Lys Leu Ile Gly Ala Pro Ala Tyr Ile Glu Cys Ser Ser
 145 150 155 160
 Lys Thr Gln Gln Asn Val Lys Ala Val Phe Asp Ala Ala Ile Lys Val
 165 170 175
 Val Leu Gln Pro Lys Thr Lys Lys Lys Lys Ser Lys Ala Gln Lys
 180 185 190
 Ala Cys Ser Ile Leu
 195

<210> 313
 <211> 581
 <212> DNA
 <213> Cavia porcellus

<400> 313
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 Met Gln Ala Ile Lys Cys Val Val Val Gly Asp Gly Ala Val Gly Lys
 1 5 10 15
 acc tgc ctc ctt atc agc tac acc acc aac gcc ttc ccc gga gag tac 96
 Thr Cys Leu Leu Ile Ser Tyr Thr Thr Asn Ala Phe Pro Gly Glu Tyr
 20 25 30
 atc ccc acc gtg ttt gac aac tat tca gcc aat gtg atg gtg gac agc 144
 Ile Pro Thr Val Phe Asp Asn Tyr Ser Ala Asn Val Met Val Asp Ser
 35 40 45
 aag ccc gtg aac ctg ggg ctg tgg gac aca gct ggc cag gag gac tat 192
 Lys Pro Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln Glu Asp Tyr
 50 55 60
 gac cgc ctg cga ccg ctc tcc tac cca cag acg gac gtc ttc ctc atc 240
 Asp Arg Leu Arg Pro Leu Ser Tyr Pro Gln Thr Asp Val Phe Leu Ile
 65 70 75 80
 tgc ttc tcc ctc gtc agt ccg gcc tcc tat gag aat gtc cat gcc aat 288
 Cys Phe Ser Leu Val Ser Pro Ala Ser Tyr Glu Asn Val His Ala Asn
 85 90 95
 tgg tac ccc aaa gtg cgg cac cac tgc ccc agc acc ccc atc atc ctg 336
 Trp Tyr Pro Lys Val Arg His His Cys Pro Ser Thr Pro Ile Ile Leu
 100 105 110
 ttg ggc acc aag ctg gac ctg cgg gat gac aag gag acc atc gag aag 384
 Leu Gly Thr Lys Leu Asp Leu Arg Asp Asp Lys Glu Thr Ile Glu Lys
 115 120 125
 ctg aag gag aag aag ctg gcg ccc atc acc tac cca cag ggc ctg gca 432
 Leu Lys Glu Lys Lys Leu Ala Pro Ile Thr Tyr Pro Gln Gly Leu Ala
 130 135 140
 ctg gcc aag gag att gac tct gtg aag tac ctg gag tgc tca gcc ctc 480
 Leu Ala Lys Glu Ile Asp Ser Val Lys Tyr Leu Glu Cys Ser Ala Leu

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145	150	155	160	
acc cag aga ggc ctg aag acc gtc ttt gac gag gcc atc cgt gcc gtc				528
Thr Gln Arg Gly Leu Lys Thr Val Phe Asp Glu Ala Ile Arg Ala Val				
	165	170	175	
ctg tgc cct cag ccc acg cgg cca cag aag cgc gcc tgc agc ctc ctc				576
Leu Cys Pro Gln Pro Thr Arg Pro Gln Lys Arg Ala Cys Ser Leu Leu				
	180	185	190	
ta tag				581

<210> 314

<211> 192

<212> PRT

<213> *Cavia porcellus*

<400> 314

Met Gln Ala Ile Lys Cys Val Val Val Gly Asp Gly Ala Val Gly Lys	
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Thr Cys Leu Leu Ile Ser Tyr Thr Thr Asn Ala Phe Pro Gly Glu Tyr	
20 25 30	
Ile Pro Thr Val Phe Asp Asn Tyr Ser Ala Asn Val Met Val Asp Ser	
35 40 45	
Lys Pro Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln Glu Asp Tyr	
50 55 60	
Asp Arg Leu Arg Pro Leu Ser Tyr Pro Gln Thr Asp Val Phe Leu Ile	
65 70 75 80	
Cys Phe Ser Leu Val Ser Pro Ala Ser Tyr Glu Asn Val His Ala Asn	
85 90 95	
Trp Tyr Pro Lys Val Arg His His Cys Pro Ser Thr Pro Ile Ile Leu	
100 105 110	
Leu Gly Thr Lys Leu Asp Leu Arg Asp Asp Lys Glu Thr Ile Glu Lys	
115 120 125	
Leu Lys Glu Lys Lys Leu Ala Pro Ile Thr Tyr Pro Gln Gly Leu Ala	
130 135 140	
Leu Ala Lys Glu Ile Asp Ser Val Lys Tyr Leu Glu Cys Ser Ala Leu	
145 150 155 160	
Thr Gln Arg Gly Leu Lys Thr Val Phe Asp Glu Ala Ile Arg Ala Val	
165 170 175	
Leu Cys Pro Gln Pro Thr Arg Pro Gln Lys Arg Ala Cys Ser Leu Leu	
180 185 190	

<210> 315

<211> 982

<212> DNA

<213> *Lotus japonicus*

<220>

<221> CDS

<222> (113)..(703)

<400> 315

atattgtgtg tctcactctt tttcgcttgt tctattttta gtttcaagtg aaagaaatat	60
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ggaaagcttt gctgtaaggt aaggaaaatc agttcagaaa aggaggttga aa atg agc	118
Met Ser	

aca gct aga ttc atc aag tgt gtt act gtt gga gat gga gca gtg gga	166
Thr Ala Arg Phe Ile Lys Cys Val Thr Val Gly Asp Gly Ala Val Gly	
5 10 15	

aag acc tgt atg ctt atc tct tac acc agc aac aca ttc cca acg gat	214
Lys Thr Cys Met Leu Ile Ser Tyr Thr Ser Asn Thr Phe Pro Thr Asp	
20 25 30	

tat gtg cct act gtt ttt gat aac ttc agt gca aat gtg gtg gtt gat	262
Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val Val Val Asp	
35 40 45 50	

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ggc agc aca gtt aac ctg gga tta tgg gac act gct gga cag gag gat 310
 Gly Ser Thr Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln Glu Asp
 55 60 65
 tac aat agg ctt agg cct ttg agc tac aga gga gca gat gtg ttc ttg 358
 Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp Val Phe Leu
 70 75 80
 ctg gct ttt tcc ctc ctt agc aga gcc agc tat gaa aat atc tcc aaa 406
 Leu Ala Phe Ser Leu Leu Ser Arg Ala Ser Tyr Glu Asn Ile Ser Lys
 85 90 95
 aag tgg att cct gaa ctg aga cac tat gcc cca act gtg cca att gtt 454
 Lys Trp Ile Pro Glu Leu Arg His Tyr Ala Pro Thr Val Pro Ile Val
 100 105 110
 ctt gtg gga acc aaa ctt gat ttg agg gaa gac agg cag tat ttg att 502
 Leu Val Gly Thr Lys Leu Asp Leu Arg Glu Asp Arg Gln Tyr Leu Ile
 115 120 125 130
 gat cat cct gga gcc aca cct att act act gcc cag gga gaa gag ctg 550
 Asp His Pro Gly Ala Thr Pro Ile Thr Thr Ala Gln Gly Glu Glu Leu
 135 140 145
 aag aag gca att ggt gct gct gtg tac cta gaa tgc agc tca aag act 598
 Lys Lys Ala Ile Gly Ala Ala Val Tyr Leu Glu Cys Ser Ser Lys Thr
 150 155 160
 caa cag aat gtg aag gct gtg ttt gat gct gct atc aag gtt gtt ttg 646
 Gln Gln Asn Val Lys Ala Val Phe Asp Ala Ala Ile Lys Val Val Leu
 165 170 175
 cag cca cct aaa cca aag aaa aaa cga aag aag acc aga cca tgc gtt 694
 Gln Pro Pro Lys Pro Lys Lys Lys Arg Lys Lys Thr Arg Pro Cys Val
 180 185 190
 ttc ctt taattgatgt tcatgtttga ttgcgaatct gtagcattcg ggaccttctt 750
 Phe Leu
 195
 cctatgtttt ttacccttta ttgattgca caaatatgct ttttgaacat atgtattaca 810
 cactcttatac ttctttccgt tttcttgat tttttgttg tgggtctaag tgatatttca 870
 atgtatctac tggaacaaac aaggagactg tactcgatca aagataaatt ttgtgataag 930
 aaataatagc attcatagtg acttttttta ttaaaaaaaaa aaaaaaaaaa aa 982

<210> 316

<211> 196

<212> PRT

<213> Lotus japonicus

<400> 316

Met Ser Thr Ala Arg Phe Ile Lys Cys Val Thr Val Gly Asp Gly Ala
 1 5 10 15
 Val Gly Lys Thr Cys Met Leu Ile Ser Tyr Thr Ser Asn Thr Phe Pro
 20 25 30
 Thr Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val Val
 35 40 45
 Val Asp Gly Ser Thr Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln
 50 55 60
 Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp Val
 65 70 75 80
 Phe Leu Leu Ala Phe Ser Leu Leu Ser Arg Ala Ser Tyr Glu Asn Ile
 85 90 95
 Ser Lys Lys Trp Ile Pro Glu Leu Arg His Tyr Ala Pro Thr Val Pro
 100 105 110
 Ile Val Leu Val Gly Thr Lys Leu Asp Leu Arg Glu Asp Arg Gln Tyr
 115 120 125
 Leu Ile Asp His Pro Gly Ala Thr Pro Ile Thr Thr Ala Gln Gly Glu
 130 135 140

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Glu Leu Lys Lys Ala Ile Gly Ala Ala Val Tyr Leu Glu Cys Ser Ser
 145 150 155 160
 Lys Thr Gln Gln Asn Val Lys Ala Val Phe Asp Ala Ala Ile Lys Val
 165 170 175
 Val Leu Gln Pro Pro Lys Pro Lys Lys Arg Lys Lys Thr Arg Pro
 180 185 190
 Cys Val Phe Leu
 195

<210> 317

<211> 659

<212> DNA

<213> Dictyostelium discoideum

<220>

<221> CDS

<222> (22)..(609)

<400> 317

gggttaaaaag tttacataat c atg caa tca att aaa ttg gtg gta gta ggt 51
 Met Gln Ser Ile Lys Leu Val Val Val Gly
 1 5 10
 gat ggt gct gtt ggt aaa act tgt tta tta att tct tat aca tca aat 99
 Asp Gly Ala Val Gly Lys Thr Cys Leu Leu Ile Ser Tyr Thr Ser Asn
 15 20 25
 tct ttc cca aca gaa tac gtt cca act gta ttt gat aac tat tca gca 147
 Ser Phe Pro Thr Glu Tyr Val Pro Thr Val Phe Asp Asn Tyr Ser Ala
 30 35 40
 aat gtt atg gta gat aat aaa act gtt tca tta ggt ctt tgg gat act 195
 Asn Val Met Val Asp Asn Lys Thr Val Ser Leu Gly Leu Trp Asp Thr
 45 50 55
 gct ggt caa gag gat tat gat cgt tta aga cca ctt tca tac cca caa 243
 Ala Gly Gln Glu Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Gln
 60 65 70
 acc gat gtt ttt ctt att tgt ttc gct att ata agt caa act tca tat 291
 Thr Asp Val Phe Leu Ile Cys Phe Ala Ile Ile Ser Gln Thr Ser Tyr
 75 80 85 90
 aca aat gta aaa tct aaa tgg tgg cct gaa gtc aca cat cat tgt cca 339
 Thr Asn Val Lys Ser Lys Trp Trp Pro Glu Val Thr His His Cys Pro
 95 100 105
 aac tgc aca att att tta gtt ggt aca aaa tgt gat tta aga gaa gac 387
 Asn Cys Thr Ile Ile Leu Val Gly Thr Lys Cys Asp Leu Arg Glu Asp
 110 115 120
 aaa gaa agt tta gaa aaa ctc aga gaa aaa cat caa caa cca ctc acc 435
 Lys Glu Ser Leu Glu Lys Leu Arg Glu Lys His Gln Gln Pro Leu Thr
 125 130 135
 ttc caa caa ggt gaa caa atg gca aaa gaa att aaa gcc ttt tgt tat 483
 Phe Gln Gln Gly Glu Gln Met Ala Lys Glu Ile Lys Ala Phe Cys Tyr
 140 145 150
 atg gaa tgt tcc gct tta act caa aaa ggt ctc aaa caa gtt ttc gac 531
 Met Glu Cys Ser Ala Leu Thr Gln Lys Gly Leu Lys Gln Val Phe Asp
 155 160 165 170
 gaa gct att aaa gct gtt att ttc cca gat aga gat aag gcc aca aac 579
 Glu Ala Ile Lys Ala Val Ile Phe Pro Asp Arg Asp Lys Ala Thr Asn
 175 180 185
 aaa aag aat tca aaa tgt tca att tta taaaaacata tcaaaatatc 626
 Lys Lys Asn Ser Lys Cys Ser Ile Leu
 190 195
 tctattcttt ataataatca caaccaaaaa aaa 659

<210> 318

<211> 195

<212> PRT

<213> Dictyostelium discoideum

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<400> 318

Met Gln Ser Ile Lys Leu Val Val Val Gly Asp Gly Ala Val Gly Lys
 1 5 10 15
 Thr Cys Leu Leu Ile Ser Tyr Thr Ser Asn Ser Phe Pro Thr Glu Tyr
 20 25 30
 Val Pro Thr Val Phe Asp Asn Tyr Ser Ala Asn Val Met Val Asp Asn
 35 40 45
 Lys Thr Val Ser Leu Gly Leu Trp Asp Thr Ala Gly Gln Glu Asp Tyr
 50 55 60
 Asp Arg Leu Arg Pro Leu Ser Tyr Pro Gln Thr Asp Val Phe Leu Ile
 65 70 75 80
 Cys Phe Ala Ile Ile Ser Gln Thr Ser Tyr Thr Asn Val Lys Ser Lys
 85 90 95
 Trp Trp Pro Glu Val Thr His His Cys Pro Asn Cys Thr Ile Ile Leu
 100 105 110
 Val Gly Thr Lys Cys Asp Leu Arg Glu Asp Lys Glu Ser Leu Glu Lys
 115 120 125
 Leu Arg Glu Lys His Gln Gln Pro Leu Thr Phe Gln Gln Gly Glu Gln
 130 135 140
 Met Ala Lys Glu Ile Lys Ala Phe Cys Tyr Met Glu Cys Ser Ala Leu
 145 150 155 160
 Thr Gln Lys Gly Leu Lys Gln Val Phe Asp Glu Ala Ile Lys Ala Val
 165 170 175
 Ile Phe Pro Asp Arg Asp Lys Ala Thr Asn Lys Lys Asn Ser Lys Cys
 180 185 190
 Ser Ile Leu
 195

<210> 319

<211> 634

<212> DNA

<213> Dictyostelium discoideum

<220>

<221> CDS

<222> (46)..(624)

<400> 319

gatcatattt aaattataca aaaaacaatt acatatatat aaaga atg tca gca gca 57
 Met Ser Ala Ala
 1
 gaa gtt att aaa tta gtc gtt att ggt gat ggt gct gta ggt aaa act 105
 Glu Val Ile Lys Leu Val Val Ile Gly Asp Gly Ala Val Gly Lys Thr
 5 10 15 20
 tgt tta ttg att agt tat gca aac aat cgt ttc cca gaa gat tat att 153
 Cys Leu Leu Ile Ser Tyr Ala Asn Asn Arg Phe Pro Glu Asp Tyr Ile
 25 30 35
 cca act gta ttc gat aat tat gtt gta aat ctt aca gca ggt gat aga 201
 Pro Thr Val Phe Asp Asn Tyr Val Val Asn Leu Thr Ala Gly Asp Arg
 40 45 50
 aac ata gaa ctc gga ctt tgg gat act gca ggt caa gaa gag tac gat 249
 Asn Ile Glu Leu Gly Leu Trp Asp Thr Ala Gly Gln Glu Glu Tyr Asp
 55 60 65
 aaa tta aga cca tta agt tat gca aat gca aat gta ttt tta att tgc 297
 Lys Leu Arg Pro Leu Ser Tyr Ala Asn Ala Asn Val Phe Leu Ile Cys
 70 75 80
 ttc tca att acc aat cca gtt tca ttt gaa aat gtt tac aca aaa tgg 345
 Phe Ser Ile Thr Asn Pro Val Ser Phe Glu Asn Val Tyr Thr Lys Trp
 85 90 95 100
 tac cca gaa gtt atg cat ttt tgc cca gaa gtt cca caa att tta gtt 393
 Tyr Pro Glu Val Met His Phe Cys Pro Glu Val Pro Gln Ile Leu Val
 105 110 115
 ggt act aaa tta gat aca cgt gac gat aga ggt gtt tta gat aaa ctt 441
 Gly Thr Lys Leu Asp Thr Arg Asp Asp Arg Gly Val Leu Asp Lys Leu
 120 125 130
 caa caa act ggt cat aaa cca att aca acc gaa caa ggt aac gat tta 489
 Gln Gln Thr Gly His Lys Pro Ile Thr Thr Glu Gln Gly Asn Asp Leu
 135 140 145

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gcc aga aga att aaa gcc att aaa tat atg gaa tgt tct gcc aaa acc      537
Ala Arg Arg Ile Lys Ala Ile Lys Tyr Met Glu Cys Ser Ala Lys Thr
   150                      155                      160
tca caa aat ctc aaa caa gtc ttt gat gaa gcc att aaa tct gtt ttg      585
Ser Gln Asn Leu Lys Gln Val Phe Asp Glu Ala Ile Lys Ser Val Leu
   165                      170                      175                      180
ttt atc aaa aaa aag aaa tcc aag tgt att gtt atg taaccgctc      631
Phe Ile Lys Lys Lys Lys Ser Lys Cys Ile Val Met
                      185                      190
tcc      634

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<210> 320

<211> 192

<212> PRT

<213> Dictyostelium discoideum

<400> 320

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Met Ser Ala Ala Glu Val Ile Lys Leu Val Val Ile Gly Asp Gly Ala
1                      5                      10                      15
Val Gly Lys Thr Cys Leu Leu Ile Ser Tyr Ala Asn Asn Arg Phe Pro
   20                      25                      30
Glu Asp Tyr Ile Pro Thr Val Phe Asp Asn Tyr Val Val Asn Leu Thr
   35                      40                      45
Ala Gly Asp Arg Asn Ile Glu Leu Gly Leu Trp Asp Thr Ala Gly Gln
   50                      55                      60
Glu Glu Tyr Asp Lys Leu Arg Pro Leu Ser Tyr Ala Asn Ala Asn Val
   65                      70                      75                      80
Phe Leu Ile Cys Phe Ser Ile Thr Asn Pro Val Ser Phe Glu Asn Val
   85                      90                      95
Tyr Thr Lys Trp Tyr Pro Glu Val Met His Phe Cys Pro Glu Val Pro
   100                     105                     110
Gln Ile Leu Val Gly Thr Lys Leu Asp Thr Arg Asp Asp Arg Gly Val
   115                     120                     125
Leu Asp Lys Leu Gln Gln Thr Gly His Lys Pro Ile Thr Thr Glu Gln
   130                     135                     140
Gly Asn Asp Leu Ala Arg Arg Ile Lys Ala Ile Lys Tyr Met Glu Cys
   145                     150                     155                     160
Ser Ala Lys Thr Ser Gln Asn Leu Lys Gln Val Phe Asp Glu Ala Ile
   165                     170                     175
Lys Ser Val Leu Phe Ile Lys Lys Lys Ser Lys Cys Ile Val Met
   180                     185                     190

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<210> 321

<211> 765

<212> DNA

<213> Dictyostelium discoideum

<220>

<221> CDS

<222> (1) .. (765)

<400> 321

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atg gct aca ggt att aag aaa act gtt aaa gta gta gtt gta ggt gat      48
Met Ala Thr Gly Ile Lys Lys Thr Val Lys Val Val Val Val Gly Asp
1                      5                      10                      15
ggt gct gtt ggt aaa act tca ctt tta att tta tat aca act aaa gca      96
Gly Ala Val Gly Lys Thr Ser Leu Leu Ile Leu Tyr Thr Thr Lys Ala
   20                      25                      30
ttc cca aaa gat tat gta cca aca gta ttt gat aac ttt aat tgt tta      144
Phe Pro Lys Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Asn Cys Leu
   35                      40                      45
gag atg tac gat aat aaa cca gtt aat tta gta ttg tgg gat acc gct      192
Glu Met Tyr Asp Asn Lys Pro Val Asn Leu Val Leu Trp Asp Thr Ala
   50                      55                      60
ggt caa gaa gat tat gat aat tta cgt cca ttg tca tat cca cag act      240

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Gly	Gln	Glu	Asp	Tyr	Asp	Asn	Leu	Arg	Pro	Leu	Ser	Tyr	Pro	Gln	Thr		
65					70					75					80		
gat	gta	ttt	ata	ata	tgt	tat	tca	gta	gtt	aaa	aga	gat	tcg	tta	gat		288
Asp	Val	Phe	Ile	Ile	Cys	Tyr	Ser	Val	Val	Lys	Arg	Asp	Ser	Leu	Asp		
				85					90					95			
aat	ata	aag	tat	aaa	tgg	tta	cct	gaa	att	aat	caa	act	aat	cag	ggg		336
Asn	Ile	Lys	Tyr	Lys	Trp	Leu	Pro	Glu	Ile	Asn	Gln	Thr	Asn	Gln	Gly		
			100					105					110				
aca	cca	att	att	tta	gtt	ggg	aca	aag	act	gat	tta	agg	gag	gac	aaa		384
Thr	Pro	Ile	Ile	Leu	Val	Gly	Thr	Lys	Thr	Asp	Leu	Arg	Glu	Asp	Lys		
		115				120						125					
aaa	aca	tta	tca	caa	tta	caa	gaa	tca	aaa	caa	gaa	cca	gtt	tca	aga		432
Lys	Thr	Leu	Ser	Gln	Leu	Gln	Glu	Ser	Lys	Gln	Glu	Pro	Val	Ser	Arg		
		130				135					140						
gat	gaa	ggg	gta	gca	tta	gca	aaa	gag	ata	ggg	gca	gta	caa	ttt	ttc		480
Asp	Glu	Gly	Val	Ala	Leu	Ala	Lys	Glu	Ile	Gly	Ala	Val	Gln	Phe	Phe		
				145		150				155				160			
gaa	tgt	tct	gca	ttg	aca	ggg	aat	ggg	gta	aat	gat	att	ttc	gct	gct		528
Glu	Cys	Ser	Ala	Leu	Thr	Gly	Asn	Gly	Val	Asn	Asp	Ile	Phe	Ala	Ala		
			165					170					175				
gca	att	aaa	gca	gct	ttt	aat	aaa	cct	gct	gta	act	tca	cca	act	tcg		576
Ala	Ile	Lys	Ala	Ala	Phe	Asn	Lys	Pro	Ala	Val	Thr	Ser	Pro	Thr	Ser		
		180				185						190					
aaa	tct	agt	ggg	aaa	tct	tca	cct	tca	tct	acc	tct	tca	aaa	cct	tct		624
Lys	Ser	Ser	Gly	Lys	Ser	Ser	Pro	Ser	Ser	Thr	Ser	Ser	Lys	Pro	Ser		
		195				200						205					
aaa	act	act	act	aca	act	aca	acc	tct	tct	tct	tct	tct	tca	cca	cct		672
Lys	Thr	Thr	Thr	Thr	Thr	Thr	Thr	Ser	Ser	Ser	Ser	Ser	Ser	Pro	Pro		
		210				215						220					
gct	gct	tca	act	gca	aaa	cca	gca	ggg	gaa	aag	aaa	tta	agt	tgg	ggg		720
Ala	Ala	Ser	Thr	Ala	Lys	Pro	Ala	Gly	Glu	Lys	Lys	Leu	Ser	Trp	Gly		
				225		230				235				240			
ttg	ttc	cgt	aaa	aaa	gat	aaa	gat	gaa	aag	aaa	cca	gca	aaa	taa			765
Leu	Phe	Arg	Lys	Lys	Asp	Lys	Asp	Glu	Lys	Lys	Pro	Ala	Lys				
				245				250									

<210> 322

<211> 254

<212> PRT

<213> Dictyostelium discoideum

<400> 322

Met	Ala	Thr	Gly	Ile	Lys	Lys	Thr	Val	Lys	Val	Val	Val	Val	Gly	Asp		
1				5					10					15			
Gly	Ala	Val	Gly	Lys	Thr	Ser	Leu	Leu	Ile	Leu	Tyr	Thr	Thr	Lys	Ala		
		20					25						30				
Phe	Pro	Lys	Asp	Tyr	Val	Pro	Thr	Val	Phe	Asp	Asn	Phe	Asn	Cys	Leu		
		35				40					45						
Glu	Met	Tyr	Asp	Asn	Lys	Pro	Val	Asn	Leu	Val	Leu	Trp	Asp	Thr	Ala		
	50				55					60							
Gly	Gln	Glu	Asp	Tyr	Asp	Asn	Leu	Arg	Pro	Leu	Ser	Tyr	Pro	Gln	Thr		
65				70						75				80			
Asp	Val	Phe	Ile	Ile	Cys	Tyr	Ser	Val	Val	Lys	Arg	Asp	Ser	Leu	Asp		
			85						90				95				
Asn	Ile	Lys	Tyr	Lys	Trp	Leu	Pro	Glu	Ile	Asn	Gln	Thr	Asn	Gln	Gly		
		100						105					110				
Thr	Pro	Ile	Ile	Leu	Val	Gly	Thr	Lys	Thr	Asp	Leu	Arg	Glu	Asp	Lys		
		115				120						125					
Lys	Thr	Leu	Ser	Gln	Leu	Gln	Glu	Ser	Lys	Gln	Glu	Pro	Val	Ser	Arg		
		130				135				140							
Asp	Glu	Gly	Val	Ala	Leu	Ala	Lys	Glu	Ile	Gly	Ala	Val	Gln	Phe	Phe		
				145		150				155				160			
Glu	Cys	Ser	Ala	Leu	Thr	Gly	Asn	Gly	Val	Asn	Asp	Ile	Phe	Ala	Ala		
			165					170					175				
Ala	Ile	Lys	Ala	Ala	Phe	Asn	Lys	Pro	Ala	Val	Thr	Ser	Pro	Thr	Ser		
		180				185						190					
Lys	Ser	Ser	Gly	Lys	Ser	Ser	Pro	Ser	Ser	Thr	Ser	Ser	Lys	Pro	Ser		

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	195		200		205	
Lys	Thr	Thr	Thr	Thr	Thr	Thr
	210		215		220	
Ala	Ala	Ser	Thr	Ala	Lys	Pro
225				230		235
Leu	Phe	Arg	Lys	Lys	Asp	Lys
			245		250	

<210> 323
 <211> 672
 <212> DNA
 <213> Dictyostelium discoideum

<220>
 <221> CDS
 <222> (1)..(672)

<400> 323
 atg tca gaa gat caa ggt tca gga gca aca aga gtt aaa tta gta gtt 48
 Met Ser Glu Asp Gln Gly Ser Gly Ala Thr Arg Val Lys Leu Val Val
 1 5 10 15
 gtc ggt gat ggt gct gtt ggt aaa aca tgt ctt tta att tgt tat gca 96
 Val Gly Asp Gly Ala Val Gly Lys Thr Cys Leu Leu Ile Cys Tyr Ala
 20 25 30
 caa aat gat ttt cca gta gat tat gta cca act gtt ttt gaa aat tat 144
 Gln Asn Asp Phe Pro Val Asp Tyr Val Pro Thr Val Phe Glu Asn Tyr
 35 40 45
 aca gca acc aga aag aga gga aat gaa gat att aaa gta cat tta tgg 192
 Thr Ala Thr Arg Lys Arg Gly Asn Glu Asp Ile Lys Val His Leu Trp
 50 55 60
 gat act gca ggc caa gaa gaa tat gat cgt tta cgt cca tta tca tac 240
 Asp Thr Ala Gly Gln Glu Tyr Asp Arg Leu Arg Pro Leu Ser Tyr
 65 70 75 80
 cca ggc gct gat gtt gtt ctc ctt tgt ttc agc aca atc agt caa tca 288
 Pro Gly Ala Asp Val Val Leu Leu Cys Phe Ser Thr Ile Ser Gln Ser
 85 90 95
 tca tat gaa gcc att aga gat aaa tgg gca cca gaa gtt aat cac tat 336
 Ser Tyr Glu Ala Ile Arg Asp Lys Trp Ala Pro Glu Val Asn His Tyr
 100 105 110
 atc cca gat gta cca tca att tta gtt ggt act aaa atc gat tta cgt 384
 Ile Pro Asp Val Pro Ser Ile Leu Val Gly Thr Lys Ile Asp Leu Arg
 115 120 125
 gaa caa caa cac cca gat cca aac tct ggt aaa ttc gaa cca atc act 432
 Glu Gln Gln His Pro Asp Pro Asn Ser Gly Lys Phe Glu Pro Ile Thr
 130 135 140
 gcc gat atg ggt att tca atg caa aaa caa att aaa gcc aag aaa tat 480
 Ala Asp Met Gly Ile Ser Met Gln Lys Gln Ile Lys Ala Lys Lys Tyr
 145 150 155 160
 tta gaa gtc tct gca aag act cgt caa ggt tta gaa gaa gtt ttc agt 528
 Leu Glu Val Ser Ala Lys Thr Arg Gln Gly Leu Glu Glu Val Phe Ser
 165 170 175
 gct gcc att gaa atc gtt ctt gaa tca aga ggt atg gat aaa aag agt 576
 Ala Ala Ile Glu Ile Val Leu Glu Ser Arg Gly Met Asp Lys Lys Ser
 180 185 190
 caa gat ggt tct tca agt gca tct ggt gtt cca tca ggt gat aaa cca 624
 Gln Asp Gly Ser Ser Ser Ala Ser Gly Val Pro Ser Gly Asp Lys Pro
 195 200 205
 aca aaa gga aaa gca ggt aaa aag aaa tct ggt tgt att ata ctt 669
 Thr Lys Gly Lys Ala Gly Lys Lys Lys Ser Gly Cys Ile Ile Leu
 210 215 220
 taa 672

<210> 324
 <211> 223
 <212> PRT

241/291

<213> Dictyostelium discoideum

<400> 324

Met Ser Glu Asp Gln Gly Ser Gly Ala Thr Arg Val Lys Leu Val Val
 1 5 10 15
 Val Gly Asp Gly Ala Val Gly Lys Thr Cys Leu Leu Ile Cys Tyr Ala
 20 25 30
 Gln Asn Asp Phe Pro Val Asp Tyr Val Pro Thr Val Phe Glu Asn Tyr
 35 40 45
 Thr Ala Thr Arg Lys Arg Gly Asn Glu Asp Ile Lys Val His Leu Trp
 50 55 60
 Asp Thr Ala Gly Gln Glu Tyr Asp Arg Leu Arg Pro Leu Ser Tyr
 65 70 75 80
 Pro Gly Ala Asp Val Val Leu Leu Cys Phe Ser Thr Ile Ser Gln Ser
 85 90 95
 Ser Tyr Glu Ala Ile Arg Asp Lys Trp Ala Pro Glu Val Asn His Tyr
 100 105 110
 Ile Pro Asp Val Pro Ser Ile Leu Val Gly Thr Lys Ile Asp Leu Arg
 115 120 125
 Glu Gln Gln His Pro Asp Pro Asn Ser Gly Lys Phe Glu Pro Ile Thr
 130 135 140
 Ala Asp Met Gly Ile Ser Met Gln Lys Gln Ile Lys Ala Lys Lys Tyr
 145 150 155 160
 Leu Glu Val Ser Ala Lys Thr Arg Gln Gly Leu Glu Glu Val Phe Ser
 165 170 175
 Ala Ala Ile Glu Ile Val Leu Glu Ser Arg Gly Met Asp Lys Lys Ser
 180 185 190
 Gln Asp Gly Ser Ser Ser Ala Ser Gly Val Pro Ser Gly Asp Lys Pro
 195 200 205
 Thr Lys Gly Lys Ala Gly Lys Lys Lys Ser Gly Cys Ile Ile Leu
 210 215 220

<210> 325

<211> 579

<212> DNA

<213> Homo sapiens

<220>

<221> CDS

<222> (1)..(579)

<400> 325

atg cag gcc atc aag ggt gtg gtg gtg gga gac gga gct gta ggt aaa 48
 Met Gln Ala Ile Lys Gly Val Val Val Gly Asp Gly Ala Val Gly Lys
 1 5 10 15
 act tgc cta ctg atc agt tac aca acc aac gca ttt cct gga gaa gat 96
 Thr Cys Leu Leu Ile Ser Tyr Thr Thr Asn Ala Phe Pro Gly Glu Asp
 20 25 30
 atc cct act gcc ttt gac aat tat tct gcc aat gtt atg gta gat gga 144
 Ile Pro Thr Ala Phe Asp Asn Tyr Ser Ala Asn Val Met Val Asp Gly
 35 40 45
 aaa ctg gtg aat ctg ggc tta tgg aat aca gct gga caa gaa gat tat 192
 Lys Leu Val Asn Leu Gly Leu Trp Asn Thr Ala Gly Gln Glu Asp Tyr
 50 55 60
 gac aga tta cgc ccc cta tcc tat ccg caa gca gat gtg ttc tta att 240
 Asp Arg Leu Arg Pro Leu Ser Tyr Pro Gln Ala Asp Val Phe Leu Ile
 65 70 75 80
 tgc ttt tcg ctt gtg agt cct gca tca ttt gaa aat gtc ctt gca aag 288
 Cys Phe Ser Leu Val Ser Pro Ala Ser Phe Glu Asn Val Leu Ala Lys
 85 90 95
 tgg tat cct gag gtg cag cac cac tgt ccc aac act ccc att atc cta 336
 Trp Tyr Pro Glu Val Gln His His Cys Pro Asn Thr Pro Ile Ile Leu
 100 105 110
 gtg gga act aaa ctt gat ctt agg gat gat aaa gac agg atc cag aaa 384
 Val Gly Thr Lys Leu Asp Leu Arg Asp Asp Lys Asp Arg Ile Gln Lys
 115 120 125
 ctg aag gag aag aag cta act ccc atc acc tat ccg cag ggt cta gcc 432
 Leu Lys Glu Lys Lys Leu Thr Pro Ile Thr Tyr Pro Gln Gly Leu Ala

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130	135	140	
atg gct aag gag atg ggt gct gta aaa tac ctg gag tgc ttg gcc ctc			480
Met Ala Lys Glu Met Gly Ala Val Lys Tyr Leu Glu Cys Leu Ala Leu			
145	150	155	160
aca agg cga ggc ctc aag aca gtg ttt gac gaa gcg atc cga gct gtc			528
Thr Arg Arg Gly Leu Lys Thr Val Phe Asp Glu Ala Ile Arg Ala Val			
165	170	175	
ctc tgc cca cct ccc gtg aag aag agg aag aga aaa tgc ctg cag ttg			576
Leu Cys Pro Pro Pro Val Lys Lys Arg Lys Arg Lys Cys Leu Gln Leu			
180	185	190	
tag			579

<210> 326

<211> 192

<212> PRT

<213> Homo sapiens

<400> 326

Met Gln Ala Ile Lys Gly Val Val Val Gly Asp Gly Ala Val Gly Lys	
1 5 10 15	
Thr Cys Leu Leu Ile Ser Tyr Thr Thr Asn Ala Phe Pro Gly Glu Asp	
20 25 30	
Ile Pro Thr Ala Phe Asp Asn Tyr Ser Ala Asn Val Met Val Asp Gly	
35 40 45	
Lys Leu Val Asn Leu Gly Leu Trp Asn Thr Ala Gly Gln Glu Asp Tyr	
50 55 60	
Asp Arg Leu Arg Pro Leu Ser Tyr Pro Gln Ala Asp Val Phe Leu Ile	
65 70 75 80	
Cys Phe Ser Leu Val Ser Pro Ala Ser Phe Glu Asn Val Leu Ala Lys	
85 90 95	
Trp Tyr Pro Glu Val Gln His His Cys Pro Asn Thr Pro Ile Ile Leu	
100 105 110	
Val Gly Thr Lys Leu Asp Leu Arg Asp Asp Lys Asp Arg Ile Gln Lys	
115 120 125	
Leu Lys Glu Lys Lys Leu Thr Pro Ile Thr Tyr Pro Gln Gly Leu Ala	
130 135 140	
Met Ala Lys Glu Met Gly Ala Val Lys Tyr Leu Glu Cys Leu Ala Leu	
145 150 155 160	
Thr Arg Arg Gly Leu Lys Thr Val Phe Asp Glu Ala Ile Arg Ala Val	
165 170 175	
Leu Cys Pro Pro Pro Val Lys Lys Arg Lys Arg Lys Cys Leu Gln Leu	
180 185 190	

<210> 327

<211> 594

<212> DNA

<213> Dictyostelium discoideum

<220>

<221> CDS

<222> (5)..(589)

<400> 327

cata atg caa gca att aaa tgt gta gtt gtt ggt gat ggt gca gtt ggt	49
Met Gln Ala Ile Lys Cys Val Val Val Gly Asp Gly Ala Val Gly	
1 5 10 15	
aaa aca tgt ctt tta att tca tat aca acc aat gct ttt cca gga gag	97
Lys Thr Cys Leu Leu Ile Ser Tyr Thr Thr Asn Ala Phe Pro Gly Glu	
20 25 30	
tat atc cca aca gtt ttt gat aat tac agc gca aat gta atg gtt gat	145
Tyr Ile Pro Thr Val Phe Asp Asn Tyr Ser Ala Asn Val Met Val Asp	
35 40 45	
ggt aaa cca att aat ctc gga tta tgg gat aca gca ggt caa gaa gat	193
Gly Lys Pro Ile Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln Glu Asp	
50 55 60	

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tat gat cgt tta cgt cct tta tcc tat cct caa act gat gtt ttc tta	241
Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Gln Thr Asp Val Phe Leu	
65 70 75	
att tgt ttt tca atc gtt tca cca gca tct ttt gag aat gta aat ggt	289
Ile Cys Phe Ser Ile Val Ser Pro Ala Ser Phe Glu Asn Val Asn Gly	
80 85 90 95	
aaa tgg cat cca gaa ata tgt cac cat gca cca aat gtt cga atc att	337
Lys Trp His Pro Glu Ile Cys His His Ala Pro Asn Val Arg Ile Ile	
100 105 110	
tta gtt ggt act aaa tta gat atg aga gaa gat aga gat act caa gat	385
Leu Val Gly Thr Lys Leu Asp Met Arg Glu Asp Arg Asp Thr Gln Asp	
115 120 125	
aga tta aaa gag aaa aaa ctt tat cca gtt tcc tat gaa caa ggt ctt	433
Arg Leu Lys Glu Lys Lys Leu Tyr Pro Val Ser Tyr Glu Gln Gly Leu	
130 135 140	
tca aaa atg aaa gaa att aat gct gtc aaa tat ctt gaa tgt tca gct	481
Ser Lys Met Lys Glu Ile Asn Ala Val Lys Tyr Leu Glu Cys Ser Ala	
145 150 155	
ctc aca caa aaa ggt ctt aaa act gtt ttt gat gaa gca att aga tct	529
Leu Thr Gln Lys Gly Leu Lys Thr Val Phe Asp Glu Ala Ile Arg Ser	
160 165 170 175	
gta att aat cca act ctt aag aaa aaa cca aaa tct tca aaa ggt tgt	577
Val Ile Asn Pro Thr Leu Lys Lys Lys Pro Lys Ser Ser Lys Gly Cys	
180 185 190	
att ata atg taaaaaaaa	594
Ile Ile Met	

<210> 328

<211> 194

<212> PRT

<213> Dictyostelium discoideum

<400> 328

Met Gln Ala Ile Lys Cys Val Val Val Gly Asp Gly Ala Val Gly Lys	
1 5 10 15	
Thr Cys Leu Leu Ile Ser Tyr Thr Thr Asn Ala Phe Pro Gly Glu Tyr	
20 25 30	
Ile Pro Thr Val Phe Asp Asn Tyr Ser Ala Asn Val Met Val Asp Gly	
35 40 45	
Lys Pro Ile Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln Glu Asp Tyr	
50 55 60	
Asp Arg Leu Arg Pro Leu Ser Tyr Pro Gln Thr Asp Val Phe Leu Ile	
65 70 75 80	
Cys Phe Ser Ile Val Ser Pro Ala Ser Phe Glu Asn Val Asn Gly Lys	
85 90 95	
Trp His Pro Glu Ile Cys His His Ala Pro Asn Val Arg Ile Ile Leu	
100 105 110	
Val Gly Thr Lys Leu Asp Met Arg Glu Asp Arg Asp Thr Gln Asp Arg	
115 120 125	
Leu Lys Glu Lys Lys Leu Tyr Pro Val Ser Tyr Glu Gln Gly Leu Ser	
130 135 140	
Lys Met Lys Glu Ile Asn Ala Val Lys Tyr Leu Glu Cys Ser Ala Leu	
145 150 155 160	
Thr Gln Lys Gly Leu Lys Thr Val Phe Asp Glu Ala Ile Arg Ser Val	
165 170 175	
Ile Asn Pro Thr Leu Lys Lys Lys Pro Lys Ser Ser Lys Gly Cys Ile	
180 185 190	
Ile Met	

<210> 329

<211> 591

<212> DNA

<213> Dictyostelium discoideum

<220>

<221> CDS

<222> (8) .. (589)

<400> 329

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aaaaaaaa atg caa gca att aaa tgt gta gtt gta ggt gat ggt gcg gtt      49
      Met Gln Ala Ile Lys Cys Val Val Val Gly Asp Gly Ala Val
      1          5          10
ggg aaa aca tgt ctt tta att tct tat aca act aac gct ttt cct gga      97
Gly Lys Thr Cys Leu Leu Ile Ser Tyr Thr Thr Asn Ala Phe Pro Gly
15          20          25          30
gag tat atc cca aca gtt ttc gat aat tac tca gct aat gtt atg gtt      145
Glu Tyr Ile Pro Thr Val Phe Asp Asn Tyr Ser Ala Asn Val Met Val
      35          40          45
gat ggt aaa cca att aat ctt ggc ttg tgg gat act gct ggt caa gaa      193
Asp Gly Lys Pro Ile Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln Glu
      50          55          60
gat tat gat cgt tta cgt cca ctt tca tat cct caa act gat gtt ttc      241
Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Gln Thr Asp Val Phe
      65          70          75
tta att tgc ttt tca att att tct cca tca tca tat gaa aat gtt tca      289
Leu Ile Cys Phe Ser Ile Ile Ser Pro Ser Ser Tyr Glu Asn Val Ser
      80          85          90
ggg aaa tgg gga cca gaa gta ttt cat cat gct cca aat gtt cca atc      337
Gly Lys Trp Gly Pro Glu Val Phe His His Ala Pro Asn Val Pro Ile
95          100          105          110
att ttg gtt ggt aca aaa atg gat atg aga gaa gat aag gaa act caa      385
Ile Leu Val Gly Thr Lys Met Asp Met Arg Glu Asp Lys Glu Thr Gln
      115          120          125
gat aga tta aaa gaa aag aaa ctt tat cca gtt tcc tat gaa caa ggt      433
Asp Arg Leu Lys Glu Lys Lys Leu Tyr Pro Val Ser Tyr Glu Gln Gly
      130          135          140
ctt tta aaa atg aaa gaa att aat gct ttc aaa tat ctt gaa tgc tct      481
Leu Leu Lys Met Lys Glu Ile Asn Ala Phe Lys Tyr Leu Glu Cys Ser
      145          150          155
gct ctc act caa aaa ggt ctt aaa act gtt ttc gac gaa gct att aga      529
Ala Leu Thr Gln Lys Gly Leu Lys Thr Val Phe Asp Glu Ala Ile Arg
      160          165          170
tct gta att aat cca cca gtt aaa aaa tca aaa agt aaa agt gga tgt      577
Ser Val Ile Asn Pro Pro Val Lys Lys Ser Lys Ser Lys Ser Gly Cys
      175          180          185          190
aat atc ttg taaaa
Asn Ile Leu

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<210> 330

<211> 193

<212> PRT

<213> Dictyostelium discoideum

<400> 330

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Met Gln Ala Ile Lys Cys Val Val Val Gly Asp Gly Ala Val Gly Lys
1          5          10          15
Thr Cys Leu Leu Ile Ser Tyr Thr Thr Asn Ala Phe Pro Gly Glu Tyr
      20          25          30
Ile Pro Thr Val Phe Asp Asn Tyr Ser Ala Asn Val Met Val Asp Gly
      35          40          45
Lys Pro Ile Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln Glu Asp Tyr
      50          55          60
Asp Arg Leu Arg Pro Leu Ser Tyr Pro Gln Thr Asp Val Phe Leu Ile
      65          70          75          80
Cys Phe Ser Ile Ile Ser Pro Ser Ser Tyr Glu Asn Val Ser Gly Lys
      85          90          95
Trp Gly Pro Glu Val Phe His His Ala Pro Asn Val Pro Ile Ile Leu
      100          105          110
Val Gly Thr Lys Met Asp Met Arg Glu Asp Lys Glu Thr Gln Asp Arg
      115          120          125
Leu Lys Glu Lys Lys Leu Tyr Pro Val Ser Tyr Glu Gln Gly Leu Leu

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[illegible]

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<210> 331
<211> 723
<212> DNA
<213> Entamoeba histolytica
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<220>  
<221> CDS  
<222> (22) .. (621)
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<400> 331																
aaataaaaaa	aaacatgacc	t	atg	aga	cca	gtg	aaa	ctt	gtc	atc	gtc	ggg			51	
			Met	Arg	Pro	Val	Lys	Leu	Val	Ile	Val	Gly				
			1				5					10				
gat	ggg	gcc	gtc	ggg	aaa	act	tgt	atg	tta	att	tca	tat	aca	aca	aat	99
Asp	Gly	Ala	Val	Gly	Lys	Thr	Cys	Met	Leu	Ile	Ser	Tyr	Thr	Thr	Asn	
			15						20					25		
gct	ttc	cca	aat	gaa	tat	att	cca	aca	gtc	ttt	gaa	aat	tat	aat	tct	147
Ala	Phe	Pro	Asn	Glu	Tyr	Ile	Pro	Thr	Val	Phe	Glu	Asn	Tyr	Asn	Ser	
			30						35				40			
tca	ttg	gtt	gtt	gat	gat	gtt	aaa	att	aat	ctt	gga	tta	tggt	gat	act	195
Ser	Leu	Val	Val	Asp	Asp	Val	Lys	Ile	Asn	Leu	Gly	Leu	Trp	Asp	Thr	
			45				50					55				
gct	gga	caa	gaa	gat	tat	gat	aga	tta	aga	cca	tta	tca	tat	cca	tca	243
Ala	Gly	Gln	Glu	Asp	Tyr	Asp	Arg	Leu	Arg	Pro	Leu	Ser	Tyr	Pro	Ser	
			60				65				70					
act	gat	gta	ttc	ctt	gtt	tgt	ttc	tcc	gtt	att	gct	cca	gct	tca	tat	291
Thr	Asp	Val	Phe	Leu	Val	Cys	Phe	Ser	Val	Ile	Ala	Pro	Ala	Ser	Tyr	
			75			80				85				90		
gaa	aat	gtt	gaa	ggg	aaa	tggt	aaa	cca	gaa	att	gat	caa	cac	tgt	cca	339
Glu	Asn	Val	Glu	Gly	Lys	Trp	Lys	Pro	Glu	Ile	Asp	Gln	His	Cys	Pro	
			95						100					105		
aat	gta	cca	att	att	ctt	gtt	gga	act	aaa	att	gat	att	aga	gat	gat	387
Asn	Val	Pro	Ile	Ile	Leu	Val	Gly	Thr	Lys	Ile	Asp	Ile	Arg	Asp	Asp	
			110						115				120			
cca	gaa	caa	gtt	aaa	cgt	tta	gct	gaa	aag	aat	att	gtc	cca	att	caa	435
Pro	Glu	Gln	Val	Lys	Arg	Leu	Ala	Glu	Lys	Asn	Ile	Val	Pro	Ile	Gln	
			125				130					135				
cct	cct	caa	gga	gat	gaa	tta	gca	aag	aaa	att	ggg	gct	gtt	aaa	tat	483
Pro	Pro	Gln	Gly	Asp	Glu	Leu	Ala	Lys	Lys	Ile	Gly	Ala	Val	Lys	Tyr	
			140			145					150					
att	gaa	tgt	tct	gct	tta	aca	caa	gcc	aat	ctt	aaa	ctt	gtt	ttt	gaa	531
Ile	Glu	Cys	Ser	Ala	Leu	Thr	Gln	Ala	Asn	Leu	Lys	Leu	Val	Phe	Glu	
			155			160				165				170		
gaa	gct	gtt	aga	gct	gtt	ctt	gct									

<210> 332

<211> 199
 <212> PRT
 <213> *Entamoeba histolytica*

<400> 332

Met Arg Pro Val Lys Leu Val Ile Val Gly Asp Gly Ala Val Gly Lys
 1 5 10 15
 Thr Cys Met Leu Ile Ser Tyr Thr Thr Asn Ala Phe Pro Asn Glu Tyr
 20 25 30
 Ile Pro Thr Val Phe Glu Asn Tyr Asn Ser Ser Leu Val Val Asp Asp
 35 40 45
 Val Lys Ile Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln Glu Asp Tyr
 50 55 60
 Asp Arg Leu Arg Pro Leu Ser Tyr Pro Ser Thr Asp Val Phe Leu Val
 65 70 75 80
 Cys Phe Ser Val Ile Ala Pro Ala Ser Tyr Glu Asn Val Glu Gly Lys
 85 90 95
 Trp Lys Pro Glu Ile Asp Gln His Cys Pro Asn Val Pro Ile Ile Leu
 100 105 110
 Val Gly Thr Lys Ile Asp Ile Arg Asp Asp Pro Glu Gln Val Lys Arg
 115 120 125
 Leu Ala Glu Lys Asn Ile Val Pro Ile Gln Pro Pro Gln Gly Asp Glu
 130 135 140
 Leu Ala Lys Lys Ile Gly Ala Val Lys Tyr Ile Glu Cys Ser Ala Leu
 145 150 155 160
 Thr Gln Ala Asn Leu Lys Leu Val Phe Glu Glu Ala Val Arg Ala Val
 165 170 175
 Leu Ala Lys Ala Ala Lys Glu Pro Thr Gly Lys Lys Glu Lys Gly Gly
 180 185 190
 Lys Lys Gly Cys Ser Leu Phe
 195

<210> 333
 <211> 597
 <212> DNA
 <213> *Candida albicans*

<220>
 <221> CDS
 <222> (1)..(597)

<400> 333

atg gtt aac ggt cca gct gaa ctt cgt aga aaa tta gtc att gtc ggt 48
 Met Val Asn Gly Pro Ala Glu Leu Arg Arg Lys Leu Val Ile Val Gly
 1 5 10 15
 gat ggt gct tgt ggt aag act tgt tta tta att gtt ttt tca aaa ggt 96
 Asp Gly Ala Cys Gly Lys Thr Cys Leu Leu Ile Val Phe Ser Lys Gly
 20 25 30
 act ttc cca gaa gtt tat gtc cca aca gtt ttt gaa aat tac gtt gct 144
 Thr Phe Pro Glu Val Tyr Val Pro Thr Val Phe Glu Asn Tyr Val Ala
 35 40 45
 gat gtt gaa gtt gat ggt aga aaa gtt gaa ttg gca tta tgg gat act 192
 Asp Val Glu Val Asp Gly Arg Lys Val Glu Leu Ala Leu Trp Asp Thr
 50 55 60
 gct ggt caa gaa gat tat gat aga tta aga cca tta tct tat cca gat 240
 Ala Gly Gln Glu Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Asp
 65 70 75 80
 tct aat gtt att ttg att tgt ttt tca gtt gat tca cca gat tct tta 288
 Ser Asn Val Ile Leu Ile Cys Phe Ser Val Asp Ser Pro Asp Ser Leu
 85 90 95
 gat aac gtt tta gaa aaa tgg att tct gaa gtt tta cat ttc tgt caa 336
 Asp Asn Val Leu Glu Lys Trp Ile Ser Glu Val Leu His Phe Cys Gln
 100 105 110
 ggt gtt cca atc att tta gtt ggt tgt aaa tct gat tta aga gat gat 384
 Gly Val Pro Ile Ile Leu Val Gly Cys Lys Ser Asp Leu Arg Asp Asp
 115 120 125
 cct cat act att gaa gcc ttg aga caa caa caa caa cca gtc tca 432
 Pro His Thr Ile Glu Ala Leu Arg Gln Gln Gln Gln Gln Pro Val Ser

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130	act tct gaa ggc caa caa gtt gct caa aga att ggt gct gct gat tac	480
	Thr Ser Glu Gly Gln Gln Val Ala Gln Arg Ile Gly Ala Ala Asp Tyr	
145	ttg gaa tgt tct gct aaa acc ggt aga ggt gtt aga gaa gtg ttt gaa	528
	Leu Glu Cys Ser Ala Lys Thr Gly Arg Gly Val Arg Glu Val Phe Glu	
165	gct gct act aga gct tct tta aga gtt aaa gaa aag aag gaa aag aag	576
	Ala Ala Thr Arg Ala Ser Leu Arg Val Lys Glu Lys Lys Glu Lys Lys	
180	aag aaa tgt gtt gtc ttg taa	597
	Lys Lys Cys Val Val Leu	
195		

<210> 334

<211> 198

<212> PRT

<213> Candida albicans

<400> 334

Met Val Asn Gly Pro Ala Glu Leu Arg Arg Lys Leu Val Ile Val Gly	
1 5 10 15	
Asp Gly Ala Cys Gly Lys Thr Cys Leu Ile Val Phe Ser Lys Gly	
20 25 30	
Thr Phe Pro Glu Val Tyr Val Pro Thr Val Phe Glu Asn Tyr Val Ala	
35 40 45	
Asp Val Glu Val Asp Gly Arg Lys Val Glu Leu Ala Leu Trp Asp Thr	
50 55 60	
Ala Gly Gln Glu Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Asp	
65 70 75 80	
Ser Asn Val Ile Leu Ile Cys Phe Ser Val Asp Ser Pro Asp Ser Leu	
85 90 95	
Asp Asn Val Leu Glu Lys Trp Ile Ser Glu Val Leu His Phe Cys Gln	
100 105 110	
Gly Val Pro Ile Ile Leu Val Gly Cys Lys Ser Asp Leu Arg Asp Asp	
115 120 125	
Pro His Thr Ile Glu Ala Leu Arg Gln Gln Gln Gln Pro Val Ser	
130 135 140	
Thr Ser Glu Gly Gln Gln Val Ala Gln Arg Ile Gly Ala Ala Asp Tyr	
145 150 155 160	
Leu Glu Cys Ser Ala Lys Thr Gly Arg Gly Val Arg Glu Val Phe Glu	
165 170 175	
Ala Ala Thr Arg Ala Ser Leu Arg Val Lys Glu Lys Lys Glu Lys Lys	
180 185 190	
Lys Lys Cys Val Val Leu	
195	

<210> 335

<211> 1165

<212> DNA

<213> Kluyveromyces lactis

<220>

<221> CDS

<222> (102)..(728)

<400> 335

aagtgtcata aaacagaatt actcaagagt tttcgaacag ctttgatttt ataatacaat	60
aaaaaaaaagt agtgatttga tttgttttaa ccctttccat a atg tct caa gct gtt	116
	Met Ser Gln Ala Val
	1 5
ggt aat gtt gcc agc att aga aga aag cta gtt att gtc ggt gat ggt	164
Gly Asn Val Ala Ser Ile Arg Arg Lys Leu Val Ile Val Gly Asp Gly	
	10 15 20
gcg tgt ggt aag act tgt tta ttg att gtt ttc gcc aag ggt aag ttc	212

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Ala	Cys	Gly	Lys	Thr	Cys	Leu	Leu	Ile	Val	Phe	Ala	Lys	Gly	Lys	Phe	
			25					30					35			
cct	cag	gtt	tac	gtg	ccc	act	gtt	ttc	gat	aat	tac	gtt	gct	gat	gtc	260
Pro	Gln	Val	Tyr	Val	Pro	Thr	Val	Phe	Asp	Asn	Tyr	Val	Ala	Asp	Val	
			40					45					50			
gaa	gtt	gac	ggg	cgt	cgc	gta	gaa	ttg	gcg	ttg	tgg	gat	act	gct	ggc	308
Glu	Val	Asp	Gly	Arg	Arg	Val	Glu	Leu	Ala	Leu	Trp	Asp	Thr	Ala	Gly	
			55					60					65			
caa	gaa	gat	tat	gat	aga	ttg	aga	cca	ctt	tcg	tac	cca	gat	tcc	aac	356
Gln	Glu	Asp	Tyr	Asp	Arg	Leu	Arg	Pro	Leu	Ser	Tyr	Pro	Asp	Ser	Asn	
			70					75			80				85	
gtt	gtg	tta	atc	tgt	tac	tca	att	gat	ttg	cca	gat	tcc	tta	gaa	aac	404
Val	Val	Leu	Ile	Cys	Tyr	Ser	Ile	Asp	Leu	Pro	Asp	Ser	Leu	Glu	Asn	
			90					95					100			
gtg	atg	gaa	aaa	tgg	atc	tct	gaa	gtt	tta	cac	ttt	tgt	caa	ggg	gtt	452
Val	Met	Glu	Lys	Trp	Ile	Ser	Glu	Val	Leu	His	Phe	Cys	Gln	Gly	Val	
			105					110					115			
cca	atc	atc	ttg	gtt	ggg	tgt	aaa	gca	gat	ttg	aga	aat	gat	cct	caa	500
Pro	Ile	Ile	Leu	Val	Gly	Cys	Lys	Ala	Asp	Leu	Arg	Asn	Asp	Pro	Gln	
			120					125					130			
gtt	gtt	gaa	gaa	cta	aga	gct	caa	gga	tta	caa	cct	gtg	tct	cag	gct	548
Val	Val	Glu	Glu	Leu	Arg	Ala	Gln	Gly	Leu	Gln	Pro	Val	Ser	Gln	Ala	
			135					140					145			
caa	gca	caa	gaa	gtc	gct	gac	caa	atc	ggg	gct	gtt	gac	tac	atc	gaa	596
Gln	Ala	Gln	Glu	Val	Ala	Asp	Gln	Ile	Gly	Ala	Val	Asp	Tyr	Ile	Glu	
			150					155					160		165	
tgt	tct	gcc	aag	acc	ggg	tac	ggg	gtc	aga	gaa	gtc	ttc	gag	gct	gct	644
Cys	Ser	Ala	Lys	Thr	Gly	Tyr	Gly	Val	Arg	Glu	Val	Phe	Glu	Ala	Ala	
			170					175					180			
aca	aga	gct	tct	ttg	gtc	ggg	aaa	caa	ggg	aag	agc	aaa	cct	aag	act	692
Thr	Arg	Ala	Ser	Leu	Val	Gly	Lys	Gln	Gly	Lys	Ser	Lys	Pro	Lys	Thr	
			185					190					195			
aag	tct	agc	aaa	aag	aag	tgt	gtc	gtc	ttg	taaataaaga	cacgcacgcc					745
Lys	Ser	Ser	Lys	Lys	Lys	Lys	Cys	Val	Val	Leu						
			200					205								
ccaaacccac	tcttcacccc	cttatctcca	acttcatttg	aattttacctt	gaaacagagg											805
actgagcttt	gaggatatta	ttattaggcg	atgggaattg	tttacaaccg	ttaattggca											865
gaagtaaaga	tccaaaaaaa	aagaagaggg	aagacgaaca	aaccatattc	atttgtttct											925
aattgatcaa	tttttaatat	acaaatgtca	gcaattaatt	tccgttgaat	ttcctaattt											985
tttctcctcg	ttcttttctt	tgtttccatc	tggtttcaag	tgaccatccc	tccctgacat											1045
tttctcttct	acctctcttc	tgttttgtgt	gtttctacct	ataaattatt	tttatatacc											1105
tacactcttt	tattttgtaa	gaaacttaaa	tattatcacc	actatactgc	acttttctcat											1165

<210> 336

<211> 208

<212> PRT

<213> Kluyveromyces lactis

<400> 336

Met	Ser	Gln	Ala	Val	Gly	Asn	Val	Ala	Ser	Ile	Arg	Arg	Lys	Leu	Val	
1				5					10					15		
Ile	Val	Gly	Asp	Gly	Ala	Cys	Gly	Lys	Thr	Cys	Leu	Leu	Ile	Val	Phe	
			20					25					30			

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Ala Lys Gly Lys Phe Pro Gln Val Tyr Val Pro Thr Val Phe Asp Asn
 35 40 45
 Tyr Val Ala Asp Val Glu Val Asp Gly Arg Arg Val Glu Leu Ala Leu
 50 55 60
 Trp Asp Thr Ala Gly Gln Glu Asp Tyr Asp Arg Leu Arg Pro Leu Ser
 65 70 75 80
 Tyr Pro Asp Ser Asn Val Val Leu Ile Cys Tyr Ser Ile Asp Leu Pro
 85 90 95
 Asp Ser Leu Glu Asn Val Met Glu Lys Trp Ile Ser Glu Val Leu His
 100 105 110
 Phe Cys Gln Gly Val Pro Ile Ile Leu Val Gly Cys Lys Ala Asp Leu
 115 120 125
 Arg Asn Asp Pro Gln Val Val Glu Glu Leu Arg Ala Gln Gly Leu Gln
 130 135 140
 Pro Val Ser Gln Ala Gln Ala Gln Glu Val Ala Asp Gln Ile Gly Ala
 145 150 155 160
 Val Asp Tyr Ile Glu Cys Ser Ala Lys Thr Gly Tyr Gly Val Arg Glu
 165 170 175
 Val Phe Glu Ala Ala Thr Arg Ala Ser Leu Val Gly Lys Gln Gly Lys
 180 185 190
 Ser Lys Pro Lys Thr Lys Ser Ser Lys Lys Lys Lys Cys Val Val Leu
 195 200 205

<210> 337

<211> 1181

<212> DNA

<213> Schizophyllum commune

<220>

<221> CDS

<222> (139)..(759)

<400> 337

ctgggtctctc gtcctttctt ccaccacgcg cagcgcgacc cacgtttctt ctccactcc 60

cgggcgctgtc ggccccgtcg cctcgcgctc ctctctcttc ctcttcgccc agctcagtga 120

caggtacaca ctcccctt atg gcg ctc tgc ggt tcg tcg aaa ggg cgc ggc 171
 Met Ala Leu Cys Gly Ser Ser Lys Gly Arg Gly
 1 5 10

agg ggc cga ccg atc cag cgc aag gtc gtc gta tgc ggc gac ggc gcg 219
 Arg Gly Arg Pro Ile Gln Arg Lys Val Val Val Cys Gly Asp Gly Ala
 15 20 25

tgc ggg aag acg agt ctg ctg aac gtc ttc acg agg ggg ttc ttc acg 267
 Cys Gly Lys Thr Ser Leu Leu Asn Val Phe Thr Arg Gly Phe Phe Thr
 30 35 40

cag gtt tat gaa ccg acg gtg ttc gag aac tac gtg cac gat ctg tat 315
 Gln Val Tyr Glu Pro Thr Val Phe Glu Asn Tyr Val His Asp Leu Tyr
 45 50 55

atc gac gac cag ctg gtg gag ctg agt ctc tgg gat acg gcg ggg cag 363
 Ile Asp Asp Gln Leu Val Glu Leu Ser Leu Trp Asp Thr Ala Gly Gln
 60 65 70 75

gag gag ttc gac cgg cta cgg agc ctg tcg tat gca gaa acg cat gtg 411
 Glu Glu Phe Asp Arg Leu Arg Ser Leu Ser Tyr Ala Glu Thr His Val
 80 85 90

atc atg ata tgc ttc agc gtc gac aat cca acg tcg ctc gag aat gtg 459
 Ile Met Ile Cys Phe Ser Val Asp Asn Pro Thr Ser Leu Glu Asn Val
 95 100 105

gag agc aag tgg ctc gac gag att ttg gag tac tgt ccg ggc gtg aag 507
 Glu Ser Lys Trp Leu Asp Glu Ile Leu Glu Tyr Cys Pro Gly Val Lys
 110 115 120

ttg gta ttg gtc gac tca aaa tgt gat cta cgc gac gac cct gca gta 555
 Leu Val Leu Val Asp Ser Lys Cys Asp Leu Arg Asp Asp Pro Ala Val
 125 130 135

ctc gat cgg cta caa cga tac ggt aca cat acg gat caa tat gaa gag 603
 Leu Asp Arg Leu Gln Arg Tyr Gly Thr His Thr Asp Gln Tyr Glu Glu

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```

140          145          150          155
ggc ctc ggg gtc gcg cga aga ata cga gct tca cga tac tta gag tgc      651
Gly Leu Gly Val Ala Arg Arg Ile Arg Ala Ser Arg Tyr Leu Glu Cys
          160          165          170
tcc tcc aaa cac aac cgg ggc gtt aac gaa gtc ttc tta cga ggc cgc      699
Ser Ser Lys His Asn Arg Gly Val Asn Glu Val Phe Leu Arg Gly Arg
          175          180          185
gcg cgt gtc act gtc cac tcg atc agg cag ggg agc gcc ggg tcg tgt      747
Ala Arg Val Thr Val His Ser Ile Arg Gln Gly Ser Ala Gly Ser Cys
          190          195          200
tgt gtc atg tagcgcacct cactctcgtc agtctagtcc cccaagccga tcgacgctgc      806
Cys Val Met
          205
gctggcgctc cccgtcgacc tctcaaactg ctctgccccca ctatgtcaca ccaagcggcc      866

catcgaccgcg tcctagacca cactacacag gtgttaggac gcaagagAAC tccagcgcg      926 ...

cccgcctctg gtcccatgc tcctgggcgt gtagtgcttc gtgcactcct gttcgtaggt      986

gcgggggtac tcctcccccac tcgtgcggtg ctcaaggacg tgtagggggc agctcggtgc      1046

gctgtccgaa taagatagat atataccccc ccaccccgaa ggtcacatac gcatggatat      1106

cttcacgctc aaatatgtta cgctccctta atctaactgc gtcttatatg ggaattgaat      1166

gcgtttgata tgggc      1181

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<210> 338

<211> 206

<212> PRT

<213> Schizophyllum commune

<400> 338

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Met Ala Leu Cys Gly Ser Ser Lys Gly Arg Gly Arg Gly Arg Pro Ile
1          5          10          15
Gln Arg Lys Val Val Val Cys Gly Asp Gly Ala Cys Gly Lys Thr Ser
          20          25          30
Leu Leu Asn Val Phe Thr Arg Gly Phe Phe Thr Gln Val Tyr Glu Pro
          35          40          45
Thr Val Phe Glu Asn Tyr Val His Asp Leu Tyr Ile Asp Asp Gln Leu
          50          55          60
Val Glu Leu Ser Leu Trp Asp Thr Ala Gly Gln Glu Glu Phe Asp Arg
65          70          75          80
Leu Arg Ser Leu Ser Tyr Ala Glu Thr His Val Ile Met Ile Cys Phe
          85          90          95
Ser Val Asp Asn Pro Thr Ser Leu Glu Asn Val Glu Ser Lys Trp Leu
          100          105          110
Asp Glu Ile Leu Glu Tyr Cys Pro Gly Val Lys Leu Val Leu Val Asp
          115          120          125
Ser Lys Cys Asp Leu Arg Asp Pro Ala Val Leu Asp Arg Leu Gln
          130          135          140
Arg Tyr Gly Thr His Thr Asp Gln Tyr Glu Glu Gly Leu Gly Val Ala
145          150          155          160
Arg Arg Ile Arg Ala Ser Arg Tyr Leu Glu Cys Ser Ser Lys His Asn
          165          170          175
Arg Gly Val Asn Glu Val Phe Leu Arg Gly Arg Ala Arg Val Thr Val
          180          185          190
His Ser Ile Arg Gln Gly Ser Ala Gly Ser Cys Cys Val Met
          195          200          205

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<210> 339
 <211> 618
 <212> DNA
 <213> Schizosaccharomyces pombe

<220>
 <221> CDS
 <222> (1)..(618)

<400> 339
 atg tca agc tgt ttc gga agt aaa aag aag cct att tat cgg aaa atc 48
 Met Ser Ser Cys Phe Gly Ser Lys Lys Lys Pro Ile Tyr Arg Lys Ile
 1 5 10 15
 gta att ctt ggt gat ggt gct gct ggt aaa acc agt ttg tta aat gta 96
 Val Ile Leu Gly Asp Gly Ala Ala Gly Lys Thr Ser Leu Leu Asn Val
 20 25 30
 ttt act aag ggt tat ttc cct cag gta tac gag cct act ata ttt gaa 144
 Phe Thr Lys Gly Tyr Phe Pro Gln Val Tyr Glu Pro Thr Ile Phe Glu
 35 40 45
 aac tac att cat gat atc ttt gtc gat gga aac agt ata gaa ctg tct 192
 Asn Tyr Ile His Asp Ile Phe Val Asp Gly Asn Ser Ile Glu Leu Ser
 50 55 60
 cta tgg gat aca gct ggt caa gaa gag tat gat caa ctg cgt tcg tta 240
 Leu Trp Asp Thr Ala Gly Gln Glu Glu Tyr Asp Gln Leu Arg Ser Leu
 65 70 75 80
 tca tat tca gat aca cat gtt att atg atc tgc ttt gcc gtg gat tca 288
 Ser Tyr Ser Asp Thr His Val Ile Met Ile Cys Phe Ala Val Asp Ser
 85 90 95
 cga gac tca tta gaa aat gta atc aca aaa tgg ctt ccg gaa gtc tct 336
 Arg Asp Ser Leu Glu Asn Val Ile Thr Lys Trp Leu Pro Glu Val Ser
 100 105 110
 agt aat tgc cct ggt gtt aaa ttg gtt ctt gtt gct cta aaa tgt gat 384
 Ser Asn Cys Pro Gly Val Lys Leu Val Leu Val Ala Leu Lys Cys Asp
 115 120 125
 tta cgt gga gct gat gag gag caa gtt gat cac agt aaa att att gat 432
 Leu Arg Gly Ala Asp Glu Glu Gln Val Asp His Ser Lys Ile Ile Asp
 130 135 140
 tac gag gaa gga ctg gca gcg gca aaa aaa atc aac gct gta cga tat 480
 Tyr Glu Glu Gly Leu Ala Ala Ala Lys Lys Ile Asn Ala Val Arg Tyr
 145 150 155 160
 tta gaa tgc agc gct aaa tta aat cgt ggc gta aat gaa gct ttc acg 528
 Leu Glu Cys Ser Ala Lys Leu Asn Arg Gly Val Asn Glu Ala Phe Thr
 165 170 175
 gaa gct gca gcg gtt gcc ctt gcc gcg caa cca aga ggt aca aag gat 576
 Glu Ala Ala Arg Val Ala Leu Ala Ala Gln Pro Arg Gly Thr Lys Asp
 180 185 190
 ggt gct gat gaa tcc cat ggt acc gga tgt atc att gct tga 618
 Gly Ala Asp Glu Ser His Gly Thr Gly Cys Ile Ile Ala
 195 200 205

<210> 340
 <211> 205
 <212> PRT
 <213> Schizosaccharomyces pombe

<400> 340
 Met Ser Ser Cys Phe Gly Ser Lys Lys Lys Pro Ile Tyr Arg Lys Ile
 1 5 10 15
 Val Ile Leu Gly Asp Gly Ala Ala Gly Lys Thr Ser Leu Leu Asn Val
 20 25 30
 Phe Thr Lys Gly Tyr Phe Pro Gln Val Tyr Glu Pro Thr Ile Phe Glu
 35 40 45
 Asn Tyr Ile His Asp Ile Phe Val Asp Gly Asn Ser Ile Glu Leu Ser
 50 55 60
 Leu Trp Asp Thr Ala Gly Gln Glu Glu Tyr Asp Gln Leu Arg Ser Leu
 65 70 75 80

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Ser Tyr Ser Asp Thr His Val Ile Met Ile Cys Phe Ala Val Asp Ser
 85 90 95
 Arg Asp Ser Leu Glu Asn Val Ile Thr Lys Trp Leu Pro Glu Val Ser
 100 105 110
 Ser Asn Cys Pro Gly Val Lys Leu Val Leu Val Ala Leu Lys Cys Asp
 115 120 125
 Leu Arg Gly Ala Asp Glu Glu Gln Val Asp His Ser Lys Ile Ile Asp
 130 135 140
 Tyr Glu Glu Gly Leu Ala Ala Ala Lys Lys Ile Asn Ala Val Arg Tyr
 145 150 155 160
 Leu Glu Cys Ser Ala Lys Leu Asn Arg Gly Val Asn Glu Ala Phe Thr
 165 170 175
 Glu Ala Ala Arg Val Ala Leu Ala Ala Gln Pro Arg Gly Thr Lys Asp
 180 185 190
 Gly Ala Asp Glu Ser His Gly Thr Gly Cys Ile Ile Ala
 195 200 205

<210> 341

<211> 582

<212> DNA

<213> Emericella nidulans

<220>

<221> CDS

<222> (1)...(582)

<400> 341

atg gct gag atc cgc cgc aag ctt gtt atc gtt ggt gat ggt gcc tgc	48
Met Ala Glu Ile Arg Arg Lys Leu Val Ile Val Gly Asp Gly Ala Cys	
1 5 10 15	
ggt aag acc tgt ctg ttg atc gtc ttc tca aag ggc act ttc cct gag	96
Gly Lys Thr Cys Leu Leu Ile Val Phe Ser Lys Gly Thr Phe Pro Glu	
20 25 30	
gtc tac gtc ccc acc gtc ttt gag aac tac gtt gcc gat gtt gag gtt	144
Val Tyr Val Pro Thr Val Phe Glu Asn Tyr Val Ala Asp Val Glu Val	
35 40 45	
gat ggc aag cac gtc gag ctc gct ctc tgg gat acg gct ggt caa gaa	192
Asp Gly Lys His Val Glu Leu Ala Leu Trp Asp Thr Ala Gly Gln Glu	
50 55 60	
gat tac gac cgt ctc cgc cct ctc tcc tac cct gac tcg cat gtc atc	240
Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Asp Ser His Val Ile	
65 70 75 80	
ctg att tgc ttc gct gtc gac tca ccg gat tcc ctt gac aac gtt caa	288
Leu Ile Cys Phe Ala Val Asp Ser Pro Asp Ser Leu Asp Asn Val Gln	
85 90 95	
gag aag tgg atc tct gaa gtc cta cac ttc tgc cag ggt ctc ccc atc	336
Glu Lys Trp Ile Ser Glu Val Leu His Phe Cys Gln Gly Leu Pro Ile	
100 105 110	
atc ctc gtc gga tgc aag aag gat ctt cgc cat gac ccc aag acg atc	384
Ile Leu Val Gly Cys Lys Lys Asp Leu Arg His Asp Pro Lys Thr Ile	
115 120 125	
gag gag ctg aac aag acc tct cag aag cct gtc acc ccc gaa cag ggt	432
Glu Glu Leu Asn Lys Thr Ser Gln Lys Pro Val Thr Pro Glu Gln Gly	
130 135 140	
gag gaa gtc cgc aag aag att ggc gcc tac aag tac ctc gag tgc tct	480
Glu Glu Val Arg Lys Lys Ile Gly Ala Tyr Lys Tyr Leu Glu Cys Ser	
145 150 155 160	
gct cga acc aac gag ggt gtc cgt gag gtc ttt gag gct gcc acg cgt	528
Ala Arg Thr Asn Glu Gly Val Arg Glu Val Phe Glu Ala Ala Thr Arg	
165 170 175	
gct gcc ctc ttg acc aag acc cac aag agc aag aag aag tgc agc atc	576
Ala Ala Leu Thr Lys Thr His Lys Ser Lys Lys Lys Cys Ser Ile	
180 185 190	
ctg taa	582
Leu	

<210> 342
 <211> 193
 <212> PRT
 <213> Emericella nidulans

<400> 342
 Met Ala Glu Ile Arg Arg Lys Leu Val Ile Val Gly Asp Gly Ala Cys
 1 5 10 15
 Gly Lys Thr Cys Leu Leu Ile Val Phe Ser Lys Gly Thr Phe Pro Glu
 20 25 30
 Val Tyr Val Pro Thr Val Phe Glu Asn Tyr Val Ala Asp Val Glu Val
 35 40 45
 Asp Gly Lys His Val Glu Leu Ala Leu Trp Asp Thr Ala Gly Gln Glu
 50 55 60
 Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Asp Ser His Val Ile
 65 70 75 80
 Leu Ile Cys Phe Ala Val Asp Ser Pro Asp Ser Leu Asp Asn Val Gln
 85 90 95
 Glu Lys Trp Ile Ser Glu Val Leu His Phe Cys Gln Gly Leu Pro Ile
 100 105 110
 Ile Leu Val Gly Cys Lys Lys Asp Leu Arg His Asp Pro Lys Thr Ile
 115 120 125
 Glu Glu Leu Asn Lys Thr Ser Gln Lys Pro Val Thr Pro Glu Gln Gly
 130 135 140
 Glu Glu Val Arg Lys Lys Ile Gly Ala Tyr Lys Tyr Leu Glu Cys Ser
 145 150 155 160
 Ala Arg Thr Asn Glu Gly Val Arg Glu Val Phe Glu Ala Ala Thr Arg
 165 170 175
 Ala Ala Leu Leu Thr Lys Thr His Lys Ser Lys Lys Lys Cys Ser Ile
 180 185 190
 Leu

<210> 343
 <211> 1086
 <212> DNA
 <213> Homo sapiens

<220>
 <221> CDS
 <222> (40)..(672)

<400> 343
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 Met Thr Ala Ala Gln
 1 5
 gcc gcg ggt gag gag gcg cca cca gcc gtg cgg tcc gtc aag gtg gtc 102
 Ala Ala Gly Glu Glu Ala Pro Pro Gly Val Arg Ser Val Lys Val Val
 10 15 20
 ctg gtg ggc gac ggc ggc tgc ggg aag acg tgc ctg ctg atg gtc ttc 150
 Leu Val Gly Asp Gly Gly Cys Gly Lys Thr Ser Leu Leu Met Val Phe
 25 30 35
 gcc gat ggg gcc ttc ccc gag agc tac acc ccc acg gtg ttt gag cgg 198
 Ala Asp Gly Ala Phe Pro Glu Ser Tyr Thr Pro Thr Val Phe Glu Arg
 40 45 50
 tac atg gtc aac ctg caa gtg aaa ggc aaa cct gtg cac ctc cac atc 246
 Tyr Met Val Asn Leu Gln Val Lys Gly Lys Pro Val His Leu His Ile
 55 60 65
 tgg gac aca gca ggg caa gat gac tat gac cgc ctg cgg ccc ctg ttc 294
 Trp Asp Thr Ala Gly Gln Asp Asp Tyr Asp Arg Leu Arg Pro Leu Phe
 70 75 80 85
 tac cct gac gcc agc gtc ctg ctg ctt tgc ttc gat gtc acc agc ccg 342
 Tyr Pro Asp Ala Ser Val Leu Leu Leu Cys Phe Asp Val Thr Ser Pro
 90 95 100
 aac agc ttt gac aac atc ttt aac cgg tgg tac cca gaa gtg aat cat 390
 Asn Ser Phe Asp Asn Ile Phe Asn Arg Trp Tyr Pro Glu Val Asn His
 105 110 115
 ttc tgc aag aag gta ccc atc atc gtc gtg ggc tgc aag act gac ctg 438

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Phe Cys Lys Lys Val Pro Ile Ile Val Val Gly Cys Lys Thr Asp Leu
 120 125 130
 cgc aag gac aaa tca ctg gtg aac aag ctc cga aga aac gga ttg gag 486
 Arg Lys Asp Lys Ser Leu Val Asn Lys Leu Arg Arg Asn Gly Leu Glu
 135 140 145
 cct gtg acc tac cac agg ggc cag gag atg gcg agg tcc gtg ggc gcg 534
 Pro Val Thr Tyr His Arg Gly Gln Glu Met Ala Arg Ser Val Gly Ala
 150 155 160 165
 gtg gcc tac ctc gag tgc tcg gct cgg ctc cat gac aac gtc cac gcc 582
 Val Ala Tyr Leu Glu Cys Ser Ala Arg Leu His Asp Asn Val His Ala
 170 175 180
 gtc ttc cag gag gcc gcc gag gtg gcc ctc agc agc cgc ggt cgc aac 630
 Val Phe Gln Glu Ala Ala Glu Val Ala Leu Ser Ser Arg Gly Arg Asn
 185 190 195
 ttc tgg cgg cgg att acc cag gcc ttt tgc gtg gtg acc tgagcggctc 679
 Phe Trp Arg Arg Ile Thr Gln Gly Phe Cys Val Val Thr
 200 205 210
 gggcgctccc agcgacgcgg gaaggggcag ggcgctgacc tgctgctgag ctggctgggc 739

 tggacccggt ccctaggctg tgaccgccga actccactgc aacagacggg cgccaccaaa 799

 gccaggccct gaggcctggg agtcctggac tgagaaaggg ggttcctggg cccacctgct 859

 ctgtgtaggg ctcgctcctgc ggtgcccagag aatcactcgc taaccctat gcccggtccc 919

 ggaccgacat cctggagccg cctgtgcagc ctgatgcccc ctctgtggctg ctcccagggc 979

 tgcacctgcc aggacctaat gttcttaggt ccctctggcc agaaccacaca cccggcccct 1039

 tcccacctgt catactggta actgtaacaa gaaaaacgac atcactt 1086

<210> 344

<211> 210

<212> PRT

<213> Homo sapiens

<400> 344

Met Thr Ala Ala Gln Ala Ala Gly Glu Glu Ala Pro Pro Gly Val Arg
 1 5 10 15
 Ser Val Lys Val Val Leu Val Gly Asp Gly Gly Cys Gly Lys Thr Ser
 20 25 30
 Leu Leu Met Val Phe Ala Asp Gly Ala Phe Pro Glu Ser Tyr Thr Pro
 35 40 45
 Thr Val Phe Glu Arg Tyr Met Val Asn Leu Gln Val Lys Gly Lys Pro
 50 55 60
 Val His Leu His Ile Trp Asp Thr Ala Gly Gln Asp Asp Tyr Asp Arg
 65 70 75 80
 Leu Arg Pro Leu Phe Tyr Pro Asp Ala Ser Val Leu Leu Leu Cys Phe
 85 90 95
 Asp Val Thr Ser Pro Asn Ser Phe Asp Asn Ile Phe Asn Arg Trp Tyr
 100 105 110
 Pro Glu Val Asn His Phe Cys Lys Lys Val Pro Ile Ile Val Val Gly
 115 120 125
 Cys Lys Thr Asp Leu Arg Lys Asp Lys Ser Leu Val Asn Lys Leu Arg
 130 135 140
 Arg Asn Gly Leu Glu Pro Val Thr Tyr His Arg Gly Gln Glu Met Ala
 145 150 155 160
 Arg Ser Val Gly Ala Val Ala Tyr Leu Glu Cys Ser Ala Arg Leu His
 165 170 175

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Asp Asn Val His Ala Val Phe Gln Glu Ala Ala Glu Val Ala Leu Ser
 180 185 190
 Ser Arg Gly Arg Asn Phe Trp Arg Arg Ile Thr Gln Gly Phe Cys Val
 195 200 205
 Val Thr
 210

<210> 345
 <211> 1166
 <212> DNA
 <213> Mus musculus

<220>
 <221> CDS
 <222> (85)..(717)

<400> 345
 gccgccgggc cagccccgcg cccgccgcag ccagcccgcc gcgtaccgcc tgctgctccg 60

 cgcaccgccg tccgccagcc aggg atg aac gcg tcc cag gtt gcg gga gaa 111
 Met Asn Ala Ser Gln Val Ala Gly Glu
 1 5
 gag gcg ccg cag agc ggg cac tcg gtc aag gtg gtc ctg gtg ggc gac 159
 Glu Ala Pro Gln Ser Gly His Ser Val Lys Val Val Leu Val Gly Asp
 10 15 20 25
 ggg ggc tgc ggg aag acg tca ctg atg atg gtc ttc gcc aaa ggg gcc 207
 Gly Gly Cys Gly Lys Thr Ser Leu Met Met Val Phe Ala Lys Gly Ala
 30 35 40
 ttc cca gag agc tac agt ccc aca gtg ttt gag cgc tat aat gcc act 255
 Phe Pro Glu Ser Tyr Ser Pro Thr Val Phe Glu Arg Tyr Asn Ala Thr
 45 50 55
 ctg cag atg aag ggt aaa cct gtg cac ctc caa atc tgg gac aca gcc 303
 Leu Gln Met Lys Gly Lys Pro Val His Leu Gln Ile Trp Asp Thr Ala
 60 65 70
 ggg caa gat gac tat gac cgc ctc cgg ccc ttg ttc tat cct gat gcc 351
 Gly Gln Asp Asp Tyr Asp Arg Leu Arg Pro Leu Phe Tyr Pro Asp Ala
 75 80 85
 aat gtc ttg ctc ctc tgc ttc gat gtg acc aat cca aac agc ttt gac 399
 Asn Val Leu Leu Leu Cys Phe Asp Val Thr Asn Pro Asn Ser Phe Asp
 90 95 100 105
 aac gtc tcc aac cgg tgg tac cca gag gtg aca cat ttc tgc aag gga 447
 Asn Val Ser Asn Arg Trp Tyr Pro Glu Val Thr His Phe Cys Lys Gly
 110 115 120
 gtg ccc atc att gtt gtg ggc tgc aag ata gac ctg cgt aag gac aag 495
 Val Pro Ile Ile Val Val Gly Cys Lys Ile Asp Leu Arg Lys Asp Lys
 125 130 135
 gtg ctg gtg aac aac ctg cgg aag aaa aga ctg gag ccc gtg acc tac 543
 Val Leu Val Asn Asn Leu Arg Lys Lys Arg Leu Glu Pro Val Thr Tyr
 140 145 150
 cac agg ggc cac gat atg gca agg tct gtg gga gcg gtg gcc tat ctt 591
 His Arg Gly His Asp Met Ala Arg Ser Val Gly Ala Val Ala Tyr Leu
 155 160 165
 gag tgt tca gct cgg ctc cat gac aac gtg gaa gca gtc ttc cag gaa 639
 Glu Cys Ser Ala Arg Leu His Asp Asn Val Glu Ala Val Phe Gln Glu
 170 175 180 185
 gca gca gaa gtg gct ctc agc agt cgc aga cat aac ttt tgg cgg cgg 687
 Ala Ala Glu Val Ala Leu Ser Ser Arg Arg His Asn Phe Trp Arg Arg
 190 195 200
 att act cag aat tgt tgc ttg gcc acc tgactggctt ggaaccacc 734
 Ile Thr Gln Asn Cys Cys Leu Ala Thr
 205 210
 ttgccaaccg gtttactccg ctgcagaaag acccagaagc agaacttgta ctctgttgac 794

 tgggatggac ctaatcccta ggctgagctg gtagaaccac acatccatcc acagatgggc 854

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tccaatgagg cctggcccct ggaaccgaat gaaacccggt aatgatagga aagaagtggg 914

cccaagaacc cttaagctct ggaaaccaat taatagaaca tcctgtgccc aaatcctgaa 974

cctgcgcctg aacgggggtct gtgcggtctg tttggcgcca accttggtggc taattctaata 1034

tgaagttata tctacaggac ctaagggttc ccaagaacca acttgcccgg gctaataacc 1094

tgcgcctgg ctcaacaacc ttaatttaata cccattgcta agtgtaacaa ctaaaatggc 1154

aagcacttgc ta 1166

<210> 346
 <211> 210
 <212> PRT
 <213> Mus musculus

<400> 346
 Met Asn Ala Ser Gln Val Ala Gly Glu Glu Ala Pro Gln Ser Gly His
 1 5 10 15
 Ser Val Lys Val Val Leu Val Gly Asp Gly Gly Cys Gly Lys Thr Ser
 20 25 30
 Leu Met Met Val Phe Ala Lys Gly Ala Phe Pro Glu Ser Tyr Ser Pro
 35 40 45
 Thr Val Phe Glu Arg Tyr Asn Ala Thr Leu Gln Met Lys Gly Lys Pro
 50 55 60
 Val His Leu Gln Ile Trp Asp Thr Ala Gly Gln Asp Asp Tyr Asp Arg
 65 70 75 80
 Leu Arg Pro Leu Phe Tyr Pro Asp Ala Asn Val Leu Leu Leu Cys Phe
 85 90 95
 Asp Val Thr Asn Pro Asn Ser Phe Asp Asn Val Ser Asn Arg Trp Tyr
 100 105 110
 Pro Glu Val Thr His Phe Cys Lys Gly Val Pro Ile Ile Val Val Gly
 115 120 125
 Cys Lys Ile Asp Leu Arg Lys Asp Lys Val Leu Val Asn Asn Leu Arg
 130 135 140
 Lys Lys Arg Leu Glu Pro Val Thr Tyr His Arg Gly His Asp Met Ala
 145 150 155 160
 Arg Ser Val Gly Ala Val Ala Tyr Leu Glu Cys Ser Ala Arg Leu His
 165 170 175
 Asp Asn Val Glu Ala Val Phe Gln Glu Ala Ala Glu Val Ala Leu Ser
 180 185 190
 Ser Arg Arg His Asn Phe Trp Arg Arg Ile Thr Gln Asn Cys Cys Leu
 195 200 205
 Ala Thr
 210

<210> 347
 <211> 735
 <212> DNA
 <213> Sus scrofa

<220>
 <221> CDS
 <222> (1)..(735)

<400> 347
 atg aag gag aga aga gcc agc cag aaa tta tcc agt aaa tct atc atg 48
 Met Lys Glu Arg Arg Ala Ser Gln Lys Leu Ser Ser Lys Ser Ile Met
 1 5 10 15

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gat cct aat cag aac gtg aaa tgc aag ata gta gtg gtg gga gat agt 96
 Asp Pro Asn Gln Asn Val Lys Cys Lys Ile Val Val Val Gly Asp Ser
 20 25 30
 cag tgt ggg aga acc gcg ctg ctg cac gtc ttc gcc aaa gac tgc ttc 144
 Gln Cys Gly Arg Thr Ala Leu Leu His Val Phe Ala Lys Asp Cys Phe
 35 40 45
 ccc gag aat tac gtc cct aca gtg ttt gag aat tac acg gcc agt ttc 192
 Pro Glu Asn Tyr Val Pro Thr Val Phe Glu Asn Tyr Thr Ala Ser Phe
 50 55 60
 gaa atc gac aca caa aga ata gaa ttg agc ctg tgg gac act tcg ggt 240
 Glu Ile Asp Thr Gln Arg Ile Glu Leu Ser Leu Trp Asp Thr Ser Gly
 65 70 75 80
 tct cct tac tat gac aac gtc cgg ccc ctc tcc tac cca gac tca gac 288
 Ser Pro Tyr Tyr Asp Asn Val Arg Pro Leu Ser Tyr Pro Asp Ser Asp
 85 90 95
 gcc gtg ctg att tgc ttt gac atc agt aga cca gag act ctg gac agt 336
 Ala Val Leu Ile Cys Phe Asp Ile Ser Arg Pro Glu Thr Leu Asp Ser
 100 105 110
 gtc ctg aaa aag tgg aaa ggt gaa atc cag gag ttt tgt ccc aac acc 384
 Val Leu Lys Lys Trp Lys Gly Glu Ile Gln Glu Phe Cys Pro Asn Thr
 115 120 125
 aaa atg ctc ttg gtc ggc tgc aaa tct gat ctt cgg aca gat gtc agt 432
 Lys Met Leu Leu Val Gly Cys Lys Ser Asp Leu Arg Thr Asp Val Ser
 130 135 140
 aca tta gta gag ctc tca aac cac agg cag aca cca gtt tcc tac gac 480
 Thr Leu Val Glu Leu Ser Asn His Arg Gln Thr Pro Val Ser Tyr Asp
 145 150 155 160
 cag ggg gca aat atg gcc aaa cag att gga gca gcc act tac atc gaa 528
 Gln Gly Ala Asn Met Ala Lys Gln Ile Gly Ala Ala Thr Tyr Ile Glu
 165 170 175
 tgc tca gct tta cag tca gaa aat agc gtc aga gac att ttt cat gtt 576
 Cys Ser Ala Leu Gln Ser Glu Asn Ser Val Arg Asp Ile Phe His Val
 180 185 190
 gcc acc ttg gca tgt gta aat aag aca aat aaa aac gtt aag cgg aac 624
 Ala Thr Leu Ala Cys Val Asn Lys Thr Asn Lys Asn Val Lys Arg Asn
 195 200 205
 aaa tcg cag agg gca aca aag cgg att tca cac atg ccc agc aga ccg 672
 Lys Ser Gln Arg Ala Thr Lys Arg Ile Ser His Met Pro Ser Arg Pro
 210 215 220
 gaa ctc tcg gca gtg gct acg gac tta cga aag gac aaa gcc aag agc 720
 Glu Leu Ser Ala Val Ala Thr Asp Leu Arg Lys Asp Lys Ala Lys Ser
 225 230 235 240
 tgc act gtg atg tga 735
 Cys Thr Val Met

<210> 348

<211> 244

<212> PRT

<213> Sus scrofa

<400> 348

Met Lys Glu Arg Arg Ala Ser Gln Lys Leu Ser Ser Lys Ser Ile Met
 1 5 10 15
 Asp Pro Asn Gln Asn Val Lys Cys Lys Ile Val Val Val Gly Asp Ser
 20 25 30
 Gln Cys Gly Arg Thr Ala Leu Leu His Val Phe Ala Lys Asp Cys Phe
 35 40 45
 Pro Glu Asn Tyr Val Pro Thr Val Phe Glu Asn Tyr Thr Ala Ser Phe
 50 55 60
 Glu Ile Asp Thr Gln Arg Ile Glu Leu Ser Leu Trp Asp Thr Ser Gly
 65 70 75 80
 Ser Pro Tyr Tyr Asp Asn Val Arg Pro Leu Ser Tyr Pro Asp Ser Asp
 85 90 95
 Ala Val Leu Ile Cys Phe Asp Ile Ser Arg Pro Glu Thr Leu Asp Ser
 100 105 110
 Val Leu Lys Lys Trp Lys Gly Glu Ile Gln Glu Phe Cys Pro Asn Thr

[illegible]

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<220>
<221> CDS
<222> (30)..(665)
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<400> 349																	
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Met Asp Ala Pro Gly Ala Leu Ala																	
1																	
cag acc gcc gcc ccc ggt cgg ggc agg aag gag ctg aag atc gtg atc	101																
Gln Thr Ala Ala Pro Gly Pro Gly Arg Lys Glu Leu Lys Ile Val Ile																	
10 15 20																	
gtg ggc gac ggc ggc tgc ggc aag acc tcg ctg ctc atg gtg tac agc	149																
Val Gly Asp Gly Gly Cys Gly Lys Thr Ser Leu Leu Met Val Tyr Ser																	
25 30 35 40																	
cag ggc tcc ttc ccc gag cac tac gcc cca tcg gtg ttc gag aag tac	197																
Gln Gly Ser Phe Pro Glu His Tyr Ala Pro Ser Val Phe Glu Lys Tyr																	
45 50 55																	
acg gcc agc agt acc gtt ggc agc aag gag gtg acc ctg aac ctc tac	245																
Thr Ala Ser Val Thr Val Gly Ser Lys Glu Val Thr Leu Asn Leu Tyr																	
60 65 70																	
gac acg gcc ggg caa gaa gac tat gac cgg ctg cgg ccc ctg tcc tac	293																
Asp Thr Ala Gly Gln Glu Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr																	
75 80 85																	
cag aac acc cac ctc gtg ctc atc tgc tat gac gtc atg aat ccc acc	341																
Gln Asn Thr His Leu Val Leu Ile Cys Tyr Asp Val Met Asn Pro Thr																	
90 95 100																	
agc tac gac aac gtc ctc atc aag tgg ttc cct gag gtc acg cat ttc	389																
Ser Tyr Asp Asn Val Leu Ile Lys Trp Phe Pro Glu Val Thr His Phe																	
105 110 115 120																	
tgc cgc ggg atc ccc atg gtg ctc atc ggc tgc aag aca gac ctg agg	437																
Cys Arg Gly Ile Pro Met Val Leu Ile Gly Cys Lys Thr Asp Leu Arg																	
125 130 135																	
aag gac aag gag cag ctg cgg aag ctc cgg gcc gcc cag ctg gag ccc	485																
Lys Asp Lys Glu Gln Leu Arg Lys Leu Arg Ala Ala Gln Leu Glu Pro																	
140 145 150																	
atc acc tac atg cag ggc ctg agc gcc tgc gaa cag atc cga gct gct	533																
Ile Thr Tyr Met Gln Gly Leu Ser Ala Cys Glu Gln Ile Arg Ala Ala																	
155 160 165																	
ctc tac ctg gaa tgt tcc gcc aag ttt cgg gag aat gtg gag gac gtc	581																
Leu Tyr Leu Glu Cys Ser Ala Lys Phe Arg Glu Asn Val Glu Asp Val																	
170 175 180																	
ttc cgg gag gcc gcc aag gtg gct ctc agc gct ctg aag aag gcg caa	629																
Phe Arg Glu Ala Ala Lys Val Ala Leu Ser Ala Leu Lys Lys Ala Gln																	
185 190 195 200																	
cgg cag aag aag cgc cgg ctc tgc ctg ctg ctc tgacccaggg cagacagacc	682																

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Arg Gln Lys Lys Arg Arg Leu Cys Leu Leu Leu

205 210
 tcacgacagc actgacaggg ccggggggccc caggtgccga ttgcaccagg gaggctgccc 742
 catcccgacc ctccagctca tgggtgtctgg ggccctgcggc tagactcttg gaacattctg 802
 gaactctctc ctttctctggc tggggctctg accacaaact cccctccagg ctgcccctgg 862
 gacatggtgg tgatgtgggt gcaggagcca gtgtctgttg tcgggactcg caagtgcctt 922
 catcacagcc acccccacca cgagtgtctc cccagtgcag actcaagtta tgcttgaaat 982
 gaaaaagtct atctggtagt gggtaaaaaa aaaaa 1017

<210> 350

<211> 211

<212> PRT

<213> Homo sapiens

<400> 350

Met Asp Ala Pro Gly Ala Leu Ala Gln Thr Ala Ala Pro Gly Pro Gly
 1 5 10 15
 Arg Lys Glu Leu Lys Ile Val Ile Val Gly Asp Gly Gly Cys Gly Lys
 20 25 30
 Thr Ser Leu Leu Met Val Tyr Ser Gln Gly Ser Phe Pro Glu His Tyr
 35 40 45
 Ala Pro Ser Val Phe Glu Lys Tyr Thr Ala Ser Val Thr Val Gly Ser
 50 55 60
 Lys Glu Val Thr Leu Asn Leu Tyr Asp Thr Ala Gly Gln Glu Asp Tyr
 65 70 75 80
 Asp Arg Leu Arg Pro Leu Ser Tyr Gln Asn Thr His Leu Val Leu Ile
 85 90 95
 Cys Tyr Asp Val Met Asn Pro Thr Ser Tyr Asp Asn Val Leu Ile Lys
 100 105 110
 Trp Phe Pro Glu Val Thr His Phe Cys Arg Gly Ile Pro Met Val Leu
 115 120 125
 Ile Gly Cys Lys Thr Asp Leu Arg Lys Asp Lys Glu Gln Leu Arg Lys
 130 135 140
 Leu Arg Ala Ala Gln Leu Glu Pro Ile Thr Tyr Met Gln Gly Leu Ser
 145 150 155 160
 Ala Cys Glu Gln Ile Arg Ala Ala Leu Tyr Leu Glu Cys Ser Ala Lys
 165 170 175
 Phe Arg Glu Asn Val Glu Asp Val Phe Arg Glu Ala Ala Lys Val Ala
 180 185 190
 Leu Ser Ala Leu Lys Lys Ala Gln Arg Gln Lys Lys Arg Arg Leu Cys
 195 200 205
 Leu Leu Leu
 210

<210> 351

<211> 684

<212> DNA

<213> Mus musculus

<220>

<221> CDS

<222> (1) .. (684)

<400> 351

atg gag ggg cag agt ggc cgc tgc aag atc gta gtg gtg ggg gac gcg 48

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Met Glu Gly Gln Ser Gly Arg Cys Lys Ile Val Val Val Gly Asp Ala
1      5      10      15
gag tgc ggc aag aca gcg ttg ctg cag gtg ttc gcc aag gac gcc tac      96
Glu Cys Gly Lys Thr Ala Leu Leu Gln Val Phe Ala Lys Asp Ala Tyr
20      25      30
ccc ggg agt tat gtc ccc acg gtg ttt gag aac tac act gcc agc ttc      144
Pro Gly Ser Tyr Val Pro Thr Val Phe Glu Asn Tyr Thr Ala Ser Phe
35      40      45
gag atc gac aag cgc cgc att gag ctc aac atg tgg gat act tca ggt      192
Glu Ile Asp Lys Arg Arg Ile Glu Leu Asn Met Trp Asp Thr Ser Gly
50      55      60
tcc tct tac tat gac aat gtc cgg cct ctg gcc tac ccg gat tct gat      240
Ser Ser Tyr Tyr Asp Asn Val Arg Pro Leu Ala Tyr Pro Asp Ser Asp
65      70      75      80
gct gtg ctt atc tgc ttt gac att agc cgg cca gaa aca ctg gac agt      288
Ala Val Leu Ile Cys Phe Asp Ile Ser Arg Pro Glu Thr Leu Asp Ser
85      90      95
gtc ctc aag aag tgg caa gga gag act cag gag ttt tgc ccc aat gcc      336
Val Leu Lys Lys Trp Gln Gly Glu Thr Gln Glu Phe Cys Pro Asn Ala
100      105      110
aag gtg gtg ctg gtt ggc tgt aag ctg gac atg cgg act gac ctg gcc      384
Lys Val Val Leu Val Gly Cys Lys Leu Asp Met Arg Thr Asp Leu Ala
115      120      125
aca ctg agg gag cta tcc aag cag aga ctc atc cct gtc aca cat gag      432
Thr Leu Arg Glu Leu Ser Lys Gln Arg Leu Ile Pro Val Thr His Glu
130      135      140
cag ggt act gtg ctg gcc aag caa gtg gga gct gtg tcc tac gtt gaa      480
Gln Gly Thr Val Leu Ala Lys Gln Val Gly Ala Val Ser Tyr Val Glu
145      150      155      160
tgt tcc tcc cga tct tct gag cgc agt gtc cgg gat gtc ttc cat gtg      528
Cys Ser Ser Arg Ser Ser Glu Arg Ser Val Arg Asp Val Phe His Val
165      170      175
gcc aca gtg gct tct ctc ggc cgt ggc cat agg cag cta cgt cgt act      576
Ala Thr Val Ala Ser Leu Gly Arg Gly His Arg Gln Leu Arg Arg Thr
180      185      190
gac tct cgc cgg gga ctg cag cga tcc act caa ctg tcg gga cgg cca      624
Asp Ser Ser Arg Gly Leu Gln Arg Ser Thr Gln Leu Ser Gly Arg Pro
195      200      205
gac cgg gga aat gag ggc gag atg cat aag gat cga gcc aag agc tgt      672
Asp Arg Gly Asn Glu Gly Glu Met His Lys Asp Arg Ala Lys Ser Cys
210      215      220
aac ctc atg tga
Asn Leu Met
225

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<210> 352

<211> 227

<212> PRT

<213> Mus musculus

<400> 352

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Met Glu Gly Gln Ser Gly Arg Cys Lys Ile Val Val Val Gly Asp Ala
1      5      10      15
Glu Cys Gly Lys Thr Ala Leu Leu Gln Val Phe Ala Lys Asp Ala Tyr
20      25      30
Pro Gly Ser Tyr Val Pro Thr Val Phe Glu Asn Tyr Thr Ala Ser Phe
35      40      45
Glu Ile Asp Lys Arg Arg Ile Glu Leu Asn Met Trp Asp Thr Ser Gly
50      55      60
Ser Ser Tyr Tyr Asp Asn Val Arg Pro Leu Ala Tyr Pro Asp Ser Asp
65      70      75      80
Ala Val Leu Ile Cys Phe Asp Ile Ser Arg Pro Glu Thr Leu Asp Ser
85      90      95
Val Leu Lys Lys Trp Gln Gly Glu Thr Gln Glu Phe Cys Pro Asn Ala
100      105      110
Lys Val Val Leu Val Gly Cys Lys Leu Asp Met Arg Thr Asp Leu Ala
115      120      125

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Thr Leu Arg Glu Leu Ser Lys Gln Arg Leu Ile Pro Val Thr His Glu
 130 135 140
 Gln Gly Thr Val Leu Ala Lys Gln Val Gly Ala Val Ser Tyr Val Glu
 145 150 155 160
 Cys Ser Ser Arg Ser Ser Glu Arg Ser Val Arg Asp Val Phe His Val
 165 170 175
 Ala Thr Val Ala Ser Leu Gly Arg Gly His Arg Gln Leu Arg Arg Thr
 180 185 190
 Asp Ser Arg Arg Gly Leu Gln Arg Ser Thr Gln Leu Ser Gly Arg Pro
 195 200 205
 Asp Arg Gly Asn Glu Gly Glu Met His Lys Asp Arg Ala Lys Ser Cys
 210 215 220
 Asn Leu Met
 225

<210> 353

<211> 576

<212> DNA

<213> Brachydanio rerio

<220>

<221> CDS

<222> (1) .. (576)

<400> 353

atg cag acg att aag tgt gtg gtg gtg gga gac ggt gca gta ggc aag 48
 Met Gln Thr Ile Lys Cys Val Val Val Gly Asp Gly Ala Val Gly Lys
 1 5 10 15
 aca tgc ctt ctt att tct tat acg aca aat gcc ttt cca gag gag tac 96
 Thr Cys Leu Leu Ile Ser Tyr Thr Thr Asn Ala Phe Pro Glu Glu Tyr
 20 25 30
 att ccc aca gtg ttt gac aac tac agt gct cag atg agt gta gat ggg 144
 Ile Pro Thr Val Phe Asp Asn Tyr Ser Ala Gln Met Ser Val Asp Gly
 35 40 45
 cgc act gtc agc ctc aac ctc tgg gac acg gca ggg cag gag gag tat 192
 Arg Thr Val Ser Leu Asn Leu Trp Asp Thr Ala Gly Gln Glu Glu Tyr
 50 55 60
 gac cgt ctg cgc acg ctt tcc tac cca caa act aat gtt ttc atc att 240
 Asp Arg Leu Arg Thr Leu Ser Tyr Pro Gln Thr Asn Val Phe Ile Ile
 65 70 75 80
 tgc ttt tcc atc gga agc cct tca tca tta gct aat gtt cgc cac aag 288
 Cys Phe Ser Ile Gly Ser Pro Ser Ser Leu Ala Asn Val Arg His Lys
 85 90 95
 tgg cac ccg gag gtg tct cac cac tgt ccc aac gtg cca att ctt cta 336
 Trp His Pro Glu Val Ser His His Cys Pro Asn Val Pro Ile Leu Leu
 100 105 110
 gtt ggc acc aag aag gat ctg cgt tca gat aca gag aca att aag aag 384
 Val Gly Thr Lys Lys Asp Leu Arg Ser Asp Thr Glu Thr Ile Lys Lys
 115 120 125
 ttg aag gag caa ggg ctt gca ccc tct act caa cag cag ggt ggc acc 432
 Leu Lys Glu Gln Gly Leu Ala Pro Ser Thr Gln Gln Gln Gly Gly Thr
 130 135 140
 ctg tgc aag cag atc aat gct gtg agg tat ctg gag tgc tgc gcg ctc 480
 Leu Cys Lys Gln Ile Asn Ala Val Arg Tyr Leu Glu Cys Ser Ala Leu
 145 150 155 160
 cgc cag gaa ggc gtg cgg gat gtg ttt gta gat gct gtt cgt gct gtg 528
 Arg Gln Glu Gly Val Arg Asp Val Phe Val Asp Ala Val Arg Ala Val
 165 170 175
 ctc tac ccc atg acc aaa aag aat acc aag aag tgt gtt ctc tta 573
 Leu Tyr Pro Met Thr Lys Lys Asn Thr Lys Lys Cys Val Leu Leu
 180 185 190
 tag 576

<210> 354

<211> 191

<212> PRT

<213> Brachydanio rerio

<400> 354

```

Met Gln Thr Ile Lys Cys Val Val Val Gly Asp Gly Ala Val Gly Lys
1          5          10          15
Thr Cys Leu Leu Ile Ser Tyr Thr Thr Asn Ala Phe Pro Glu Glu Tyr
          20          25          30
Ile Pro Thr Val Phe Asp Asn Tyr Ser Ala Gln Met Ser Val Asp Gly
          35          40          45
Arg Thr Val Ser Leu Asn Leu Trp Asp Thr Ala Gly Gln Glu Glu Tyr
          50          55          60
Asp Arg Leu Arg Thr Leu Ser Tyr Pro Gln Thr Asn Val Phe Ile Ile
65          70          75          80
Cys Phe Ser Ile Gly Ser Pro Ser Ser Leu Ala Asn Val Arg His Lys
          85          90          95
Trp His Pro Glu Val Ser His His Cys Pro Asn Val Pro Ile Leu Leu
          100          105          110
Val Gly Thr Lys Lys Asp Leu Arg Ser Asp Thr Glu Thr Ile Lys Lys
          115          120          125
Leu Lys Glu Gln Gly Leu Ala Pro Ser Thr Gln Gln Gln Gly Gly Thr
          130          135          140
Leu Cys Lys Gln Ile Asn Ala Val Arg Tyr Leu Glu Cys Ser Ala Leu
145          150          155          160
Arg Gln Glu Gly Val Arg Asp Val Phe Val Asp Ala Val Arg Ala Val
          165          170          175
Leu Tyr Pro Met Thr Lys Lys Asn Thr Lys Lys Cys Val Leu Leu
          180          185          190

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<210> 355

<211> 576

<212> DNA

<213> Xenopus laevis

<220>

<221> CDS

<222> (1)..(576)

<400> 355

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atg cag agc att aag tgt gtg gtg gtg ggc gac gga gca gtg gga aag      48
Met Gln Ser Ile Lys Cys Val Val Val Gly Asp Gly Ala Val Gly Lys
1          5          10          15
acc tgt tta ctc atc tgc ttc aca acc aac gcc ttc cct aag gaa tac      96
Thr Cys Leu Leu Ile Cys Phe Thr Thr Asn Ala Phe Pro Lys Glu Tyr
          20          25          30
atc ccc aca gtg ttt gat aac tac agc gcc cag acg gca gtt gac ggg      144
Ile Pro Thr Val Phe Asp Asn Tyr Ser Ala Gln Thr Ala Val Asp Gly
          35          40          45
agg aca gtt agc ttg aac ctg tgg gac act gct ggc cag gaa gag tat      192
Arg Thr Val Ser Leu Asn Leu Trp Asp Thr Ala Gly Gln Glu Glu Tyr
          50          55          60
gac aga ctg cgt aca ctt tct tac cca cag acc aac gtc ttc atc att      240
Asp Arg Leu Arg Thr Leu Ser Tyr Pro Gln Thr Asn Val Phe Ile Ile
65          70          75          80
tgc ttt tcc atc gcc agc cca acc tcc tat gag aat gta aag cac aag      288
Cys Phe Ser Ile Ala Ser Pro Thr Ser Tyr Glu Asn Val Lys His Lys
          85          90          95
tgg tac cct gag gtg ggt cac cat tgt ccc aac gtg ccc att ctc ttg      336
Trp Tyr Pro Glu Val Gly His His Cys Pro Asn Val Pro Ile Leu Leu
          100          105          110
gtg ggc acc aag aag gat ctt agg aac aac gca gat gtc ata aag aag      384
Val Gly Thr Lys Lys Asp Leu Arg Asn Asn Ala Asp Val Ile Lys Lys
          115          120          125
ctg aaa gag cag aac caa atg ccc atc act aac cat cag ggt gga aat      432
Leu Lys Glu Gln Asn Gln Met Pro Ile Thr Asn His Gln Gly Gly Asn
          130          135          140
ctg gcc aag cag atc cat gca gta aag tat atg gag tgc tcg gcg ctg      480
Leu Ala Lys Gln Ile His Ala Val Lys Tyr Met Glu Cys Ser Ala Leu

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145		150		155		160	
aat caa gat ggc atc	aag gaa gtg ttt gcg gat gct gtg cga gct gtt	528					
Asn Gln Asp Gly Ile	Lys Glu Val Phe Ala Asp Ala Val Arg Ala Val						
	165	170	175				
ctc aac ccg act ccc atc aag gac aaa aag agc tgc ttc att ttg	573						
Leu Asn Pro Thr Pro Ile Lys Asp Lys Lys Ser Cys Phe Ile Leu							
	180	185	190				
tga			576				

<210> 356
 <211> 191
 <212> PRT
 <213> *Xenopus laevis*

<400> 356

Met Gln Ser Ile	Lys Cys Val Val Val Gly Asp Gly Ala Val Gly Lys
1	5 10 15
Thr Cys Leu Leu Ile Cys Phe Thr Thr Asn Ala Phe Pro Lys Glu Tyr	20 25 30
Ile Pro Thr Val Phe Asp Asn Tyr Ser Ala Gln Thr Ala Val Asp Gly	35 40 45
Arg Thr Val Ser Leu Asn Leu Trp Asp Thr Ala Gly Gln Glu Glu Tyr	50 55 60
Asp Arg Leu Arg Thr Leu Ser Tyr Pro Gln Thr Asn Val Phe Ile Ile	65 70 75 80
Cys Phe Ser Ile Ala Ser Pro Thr Ser Tyr Glu Asn Val Lys His Lys	85 90 95
Trp Tyr Pro Glu Val Gly His His Cys Pro Asn Val Pro Ile Leu Leu	100 105 110
Val Gly Thr Lys Lys Asp Leu Arg Asn Asn Ala Asp Val Ile Lys Lys	115 120 125
Leu Lys Glu Gln Asn Gln Met Pro Ile Thr Asn His Gln Gly Gly Asn	130 135 140
Leu Ala Lys Gln Ile His Ala Val Lys Tyr Met Glu Cys Ser Ala Leu	145 150 155 160
Asn Gln Asp Gly Ile Lys Glu Val Phe Ala Asp Ala Val Arg Ala Val	165 170 175
Leu Asn Pro Thr Pro Ile Lys Asp Lys Lys Ser Cys Phe Ile Leu	180 185 190

<210> 357
 <211> 591
 <212> DNA
 <213> *Xenopus tropicalis*

<220>
 <221> CDS
 <222> (1)..(591)

<400> 357

atg gcc gcg ata cgc aag aag ctg gtg gtg gtc ggg gac gga gct tgc	48
Met Ala Ala Ile Arg Lys Lys Leu Val Val Val Gly Asp Gly Ala Cys	
1	5 10 15
ggc aaa acc tgc ctc ctc atc gtc ttc agc aag gac gag ttc ccc gag	96
Gly Lys Thr Cys Leu Leu Ile Val Phe Ser Lys Asp Glu Phe Pro Glu	
	20 25 30
gtg tac gtt ccc acc gtg ttc gag aac tac gtg gcc gat atc gag gtg	144
Val Tyr Val Pro Thr Val Phe Glu Asn Tyr Val Ala Asp Ile Glu Val	
	35 40 45
gac gtg aag cag gtg gag ctg gcc ctg tgg gac acg gcg ggg cag gag	192
Asp Val Lys Gln Val Glu Leu Ala Leu Trp Asp Thr Ala Gly Gln Glu	
	50 55 60
gac tac gac cgg ctg cgg cct ctc tcc tac ccc gac acg gac gtc atc	240
Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Asp Thr Asp Val Ile	
65	70 75 80

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ctc atg tgc ttc tcc gtg gac agc ccg gac tcg ctg gag aac atc ccg      288
Leu Met Cys Phe Ser Val Asp Ser Pro Asp Ser Leu Glu Asn Ile Pro
      85                      90                      95
gag aag tgg gtg ccc gag gtg aag cac ttc tgc ccc agc gtc ccc atc      336
Glu Lys Trp Val Pro Glu Val Lys His Phe Cys Pro Ser Val Pro Ile
      100                    105                    110
atc ctg gtg gcc aac aag aag gac ctg agg aac gac gag cac gtc cgc      384
Ile Leu Val Ala Asn Lys Lys Asp Leu Arg Asn Asp Glu His Val Arg
      115                    120                    125
aac gag ctg gcc cgc atg aag cag gag ccg gtc cgc acc gag gac ggc      432
Asn Glu Leu Ala Arg Met Lys Gln Glu Pro Val Arg Thr Glu Asp Gly
      130                    135                    140
agg gcc atg gcc gtg agg att aac gcc ttc gag tac ctg gag tgc tcg      480
Arg Ala Met Ala Val Arg Ile Asn Ala Phe Glu Tyr Leu Glu Cys Ser
      145                    150                    155                    160
gcc aag acc aag gaa ggg gtc cgg gag gtg ttc gaa acg gcc act agg      528
Ala Lys Thr Lys Glu Gly Val Arg Glu Val Phe Glu Thr Ala Thr Arg
      165                    170                    175
gcg gcg ctg cag aag aaa cac ggc cgg agc ggt gaa tgt atg agc tgc      576
Ala Ala Leu Gln Lys Lys His Gly Arg Ser Gly Glu Cys Met Ser Cys
      180                    185                    190
tgt aag ctc ctc tga
Cys Lys Leu Leu
      195

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<210> 358
 <211> 196
 <212> PRT
 <213> *Xenopus tropicalis*

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<400> 358
Met Ala Ala Ile Arg Lys Lys Leu Val Val Val Gly Asp Gly Ala Cys
1      5      10      15
Gly Lys Thr Cys Leu Leu Ile Val Phe Ser Lys Asp Glu Phe Pro Glu
      20      25      30
Val Tyr Val Pro Thr Val Phe Glu Asn Tyr Val Ala Asp Ile Glu Val
      35      40      45
Asp Val Lys Gln Val Glu Leu Ala Leu Trp Asp Thr Ala Gly Gln Glu
      50      55      60
Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Asp Thr Asp Val Ile
      65      70      75      80
Leu Met Cys Phe Ser Val Asp Ser Pro Asp Ser Leu Glu Asn Ile Pro
      85      90      95
Glu Lys Trp Val Pro Glu Val Lys His Phe Cys Pro Ser Val Pro Ile
      100     105     110
Ile Leu Val Ala Asn Lys Lys Asp Leu Arg Asn Asp Glu His Val Arg
      115     120     125
Asn Glu Leu Ala Arg Met Lys Gln Glu Pro Val Arg Thr Glu Asp Gly
      130     135     140
Arg Ala Met Ala Val Arg Ile Asn Ala Phe Glu Tyr Leu Glu Cys Ser
      145     150     155     160
Ala Lys Thr Lys Glu Gly Val Arg Glu Val Phe Glu Thr Ala Thr Arg
      165     170     175
Ala Ala Leu Gln Lys Lys His Gly Arg Ser Gly Glu Cys Met Ser Cys
      180     185     190
Cys Lys Leu Leu
      195

```

<210> 359
 <211> 735
 <212> DNA
 <213> *Xenopus laevis*

<220>
 <221> CDS
 <222> (1)..(735)

<400> 359
 atg aag gaa aga aga acg agt cag aaa ctg gcc agc aaa tca atg atg 48
 Met Lys Glu Arg Arg Thr Ser Gln Lys Leu Ala Ser Lys Ser Met Met
 1 5 10 15
 gat ccc aac cag aat gtg aaa tgt aaa att gtg gtg gtg ggg gac agc 96
 Asp Pro Asn Gln Asn Val Lys Cys Lys Ile Val Val Val Gly Asp Ser
 20 25 30
 cag tgt ggc aaa act gcc ctg ctc cat gtc ttt gcc aag gac tcc ttc 144
 Gln Cys Gly Lys Thr Ala Leu Leu His Val Phe Ala Lys Asp Ser Phe
 35 40 45
 cca gag aac tat gtc ccc acc gta ttt gag aat tac acg gcc agt ttt 192
 Pro Glu Asn Tyr Val Pro Thr Val Phe Glu Asn Tyr Thr Ala Ser Phe
 50 55 60
 gaa att gac acg cag agg ata gaa ctg agt ctc tgg gat aca tct ggt 240
 Glu Ile Asp Thr Gln Arg Ile Glu Leu Ser Leu Trp Asp Thr Ser Gly
 65 70 75 80
 tcc cct tat tat gac aac gtc cga cct ctt agc tat cca gac tct gac 288
 Ser Pro Tyr Tyr Asp Asn Val Arg Pro Leu Ser Tyr Pro Asp Ser Asp
 85 90 95
 gcc gtt ttg ata tgt ttc gat atc agt cgc ccc gag acg ctt gac agt 336
 Ala Val Leu Ile Cys Phe Asp Ile Ser Arg Pro Glu Thr Leu Asp Ser
 100 105 110
 gtt ctt aaa aag tgg aaa ggt gaa att caa gaa ttc tgc ccc aat acc 384
 Val Leu Lys Lys Trp Lys Gly Glu Ile Gln Glu Phe Cys Pro Asn Thr
 115 120 125
 aaa atg ctg ctg gtt ggc tgc aaa tcc gac ctc cgt aca gat cta acc 432
 Lys Met Leu Leu Val Gly Cys Lys Ser Asp Leu Arg Thr Asp Leu Thr
 130 135 140
 aca tta gta gaa cta tct aac cac aga cag acg cca gtc tcc tat gat 480
 Thr Leu Val Glu Leu Ser Asn His Arg Gln Thr Pro Val Ser Tyr Asp
 145 150 155 160
 cag ggg gca aac atg gcc aag cag ata gga gca gcc acg tac atc gaa 528
 Gln Gly Ala Asn Met Ala Lys Gln Ile Gly Ala Ala Thr Tyr Ile Glu
 165 170 175
 tgc tct gcg tta cag tct gag aac agt gtc aga gac att ttc cat gta 576
 Cys Ser Ala Leu Gln Ser Glu Asn Ser Val Arg Asp Ile Phe His Val
 180 185 190
 gcc acc ctg gca tgt gtg aat aag act aac aaa aat ctt aaa agg aat 624
 Ala Thr Leu Ala Cys Val Asn Lys Thr Asn Lys Asn Leu Lys Arg Asn
 195 200 205
 aaa act caa aga gcc aca aag aga atc tcg cac atg ccg agt cgg cca 672
 Lys Thr Gln Arg Ala Thr Lys Arg Ile Ser His Met Pro Ser Arg Pro
 210 215 220
 gaa cta agt gct gtg gcc aca gac ttg agg aag gat aaa gca aag agc 720
 Glu Leu Ser Ala Val Ala Thr Asp Leu Arg Lys Asp Lys Ala Lys Ser
 225 230 235 240
 tgc agc atc atg tga 735
 Cys Ser Ile Met

<210> 360

<211> 244

<212> PRT

<213> *Xenopus laevis*

<400> 360

Met Lys Glu Arg Arg Thr Ser Gln Lys Leu Ala Ser Lys Ser Met Met
 1 5 10 15
 Asp Pro Asn Gln Asn Val Lys Cys Lys Ile Val Val Val Gly Asp Ser
 20 25 30
 Gln Cys Gly Lys Thr Ala Leu Leu His Val Phe Ala Lys Asp Ser Phe
 35 40 45
 Pro Glu Asn Tyr Val Pro Thr Val Phe Glu Asn Tyr Thr Ala Ser Phe
 50 55 60
 Glu Ile Asp Thr Gln Arg Ile Glu Leu Ser Leu Trp Asp Thr Ser Gly
 65 70 75 80
 Ser Pro Tyr Tyr Asp Asn Val Arg Pro Leu Ser Tyr Pro Asp Ser Asp

[illegible]

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<210> 361
<211> 1035
<212> DNA
<213> Pagrus major
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<220>  
<221> CDS  
<222> (25) .. (603)
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<400> 361																51
cggcacgagg cgcagcggaa cagg atg cag gct atc aaa tgt gtg gtc gtg																
Met Gln Ala Ile Lys Cys Val Val Val																
1 5																
gga	gat	gga	gct	gtg	gga	aaa	aca	tgt	ctt	ctc	atc	agc	tac	aca	acc	99
Gly	Asp	Gly	Ala	Val	Gly	Lys	Thr	Cys	Leu	Leu	Ile	Ser	Tyr	Thr	Thr	
10				15					20					25		
aat	gcc	ttc	ccc	ggg	gag	tac	att	cct	act	gta	ttt	gac	aac	tac	tca	147
Asn	Ala	Phe	Pro	Gly	Glu	Tyr	Ile	Pro	Thr	Val	Phe	Asp	Asn	Tyr	Ser	
			30					35					40			
gct	aat	gtg	atg	gtg	gac	agc	aag	cca	gtc	aac	ctg	ggc	ctc	tgg	gat	195
Ala	Asn	Val	Met	Val	Asp	Ser	Lys	Pro	Val	Asn	Leu	Gly	Leu	Trp	Asp	
			45				50					55				
aca	gct	gga	cag	gaa	gac	tac	gac	agg	ctc	cgc	cca	ctg	tcc	tac	cca	243
Thr	Ala	Gly	Gln	Glu	Asp	Tyr	Asp	Arg	Leu	Arg	Pro	Leu	Ser	Tyr	Pro	
		60				65					70					
cag	acg	gat	gtt	ttc	ctg	atc	tgt	ttc	tcc	ctg	gtg	agc	cca	gcg	tcc	291
Gln	Thr	Asp	Val	Phe	Leu	Ile	Cys	Phe	Ser	Leu	Val	Ser	Pro	Ala	Ser	
	75				80					85						
tat	gag	aac	gtc	aga	gct	aag	tgg	tac	cca	gag	gtt	cgc	cac	cac	tgc	339
Tyr	Glu	Asn	Val	Arg	Ala	Lys	Trp	Tyr	Pro	Glu	Val	Arg	His	His	Cys	
90				95					100					105		
ccc	tcc	aca	cct	atc	atc	ctg	gtg	ggc	acc	aag	ctg	gat	ctg	agg	gac	387
Pro	Ser	Thr	Pro	Ile	Ile	Leu	Val	Gly	Thr	Lys	Leu	Asp	Leu	Arg	Asp	
			110					115					120			
gag	aag	gaa	acc	att	gag	aag	ctg	aag	gaa	aaa	aag	ctg	gcg	ccg	atc	435
Glu	Lys	Glu	Thr	Ile	Glu	Lys	Leu	Lys	Glu	Lys	Lys	Leu	Ala	Pro	Ile	
		125				130						135				
acc	tac	ccc	cag	ggc	ctg	gct	ctg	gct	aag	gag	atc	gat	gca	gtg	aag	483
Thr	Tyr	Pro	Gln	Gly	Leu	Ala	Leu	Ala	Lys	Glu	Ile	Asp	Ala	Val	Lys	
		140				145						150				
tac	ctg	gag	tgc	tca	gcc	ttg	acc	cag	cgt	ggc	ctg	aag	acc	gtg	ttc	531
Tyr	Leu	Glu	Cys	Ser	Ala	Leu	Thr	Gln	Arg	Gly	Leu	Lys	Thr	Val	Phe	
	155				160					165						
gac	gag	gcc	atc	cgg	gcc	gtg	ctc	tgc	cct	cag	ccc	acc	aag	gtc	aag	579
Asp	Glu	Ala	Ile	Arg	Ala	Val	Leu	Cys	Pro	Gln	Pro	Thr	Lys	Val	Lys	
170				175					180					185		

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aag aag ccg tgc tca ctg ctg taaatgattc ttgcaagacg aagacgacga 630
 Lys Lys Pro Cys Ser Leu Leu
 190
 cgatgagaaa gcgtttgcga ctgatgaaaa ggtgaaaaga agacgatggg aaagtctctgt 690
 tatgtttaat gggtttgtgat agaagactgc gactagattt ccactagggtt agaaaaaaat 750
 aatgcttctg cggtgatgat aaatggtaaa tggtagcaaa ccctttctgt acagcatact 810
 ctgagactga ttattcaagt gcattataga ccaggcagac atttcactgt aaaattgaac 870
 aaagtataat actagatgtg gaggctgaca cactgtacat tcatacctgtg ggcttaaagt 930
 gtcagatcaa gagcagcaaa gcacctgcac aacggactct gctgtccctt ttggggctga 990
 cagtatgtac acaggtgtct tgtgcggctt cacataatga taata 1035

<210> 362

<211> 192

<212> PRT

<213> Pagrus major

<400> 362

Met Gln Ala Ile Lys Cys Val Val Val Gly Asp Gly Ala Val Gly Lys
 1 5 10 15
 Thr Cys Leu Leu Ile Ser Tyr Thr Thr Asn Ala Phe Pro Gly Glu Tyr
 20 25 30
 Ile Pro Thr Val Phe Asp Asn Tyr Ser Ala Asn Val Met Val Asp Ser
 35 40 45
 Lys Pro Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln Glu Asp Tyr
 50 55 60
 Asp Arg Leu Arg Pro Leu Ser Tyr Pro Gln Thr Asp Val Phe Leu Ile
 65 70 75 80
 Cys Phe Ser Leu Val Ser Pro Ala Ser Tyr Glu Asn Val Arg Ala Lys
 85 90 95
 Trp Tyr Pro Glu Val Arg His His Cys Pro Ser Thr Pro Ile Ile Leu
 100 105 110
 Val Gly Thr Lys Leu Asp Leu Arg Asp Glu Lys Glu Thr Ile Glu Lys
 115 120 125
 Leu Lys Glu Lys Lys Leu Ala Pro Ile Thr Tyr Pro Gln Gly Leu Ala
 130 135 140
 Leu Ala Lys Glu Ile Asp Ala Val Lys Tyr Leu Glu Cys Ser Ala Leu
 145 150 155 160
 Thr Gln Arg Gly Leu Lys Thr Val Phe Asp Glu Ala Ile Arg Ala Val
 165 170 175
 Leu Cys Pro Gln Pro Thr Lys Val Lys Lys Lys Pro Cys Ser Leu Leu
 180 185 190

<210> 363

<211> 1090

<212> DNA

<213> Schizophyllum commune

<220>

<221> CDS

<222> (145)..(735)

<400> 363

gctgctcgcc ttgttcttcc attgtccatc cccttgcccg tgctcccgcg gtcgctgaac 60

gtacccaagc cctcgctcc cgcgcgcgc gtctgccttc ttcccctcgg tttccgatag 120

tcgctccggt gccagtcctc cagt atg cag gcc atc aag tgt gtt gtc gta 171
Met Gln Ala Ile Lys Cys Val Val Val

gga gat ggt gcg gtc gga aag acc tgc ctg cta atc tcg tat acc acg 219
Gly Asp Gly Ala Val Gly Lys Thr Cys Leu Ile Ser Tyr Thr Thr

aac gcg ttc ccg gga gaa tat atc ccg acc gtg ttc gat aac tac tcc 267
Asn Ala Phe Pro Gly Glu Tyr Ile Pro Thr Val Phe Asp Asn Tyr Ser

gcc aat gtc atg gtc gac ggc aag act atc tcc ctc ggg ctt tgg gat 315
Ala Asn Val Met Val Asp Gly Lys Thr Ile Ser Leu Gly Leu Trp Asp

acc gct ggt caa gaa gat tac gac cgt ctc cgc ccg ctc tcc tac cct 363
Thr Ala Gly Gln Glu Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro

cag acg gat gtc ttc ttg att tgt ttc tcg ctc gtc agc ccg cca agt 411
Gln Thr Asp Val Phe Leu Ile Cys Phe Ser Leu Val Ser Pro Pro Ser

ttc gag aac gtc cgg acc aag tgg tac cct gaa ata tcg cat cac gca 459
Phe Glu Asn Val Arg Thr Lys Trp Tyr Pro Glu Ile Ser His His Ala

ccg cag acg ccc gtc gtg ctc gtg ggc acc aag ctg gat ttg cga gag 507
Pro Gln Thr Pro Val Val Leu Val Gly Thr Lys Leu Asp Leu Arg Glu

gac cct gcg acg ata gag aaa ctg cgt gac cgc cgc atg tcc ccc atc 555
Asp Pro Ala Thr Ile Glu Lys Leu Arg Asp Arg Arg Met Ser Pro Ile

cag tac tcg cag ggt gtc gcg atg atg aag gac atc ggt gct gtg aag 603
Gln Tyr Ser Gln Gly Val Ala Met Met Lys Asp Ile Gly Ala Val Lys

tac cta gag tgt tcc gcg ctg acg caa aag ggg ctc aag acc gtg ttt 651
Tyr Leu Glu Cys Ser Ala Leu Thr Gln Lys Gly Leu Lys Thr Val Phe

gac gag gcg atc cgt gtt gtc ttg tac ccg tcc gcg cgg tcc gac aac 699
Asp Glu Ala Ile Arg Val Val Leu Tyr Pro Ser Ala Arg Ser Asp Asn

aaa cgc agc aag ggc cgc tca tgc att gtc gca taagtggact ccagcgcgcg 752
Lys Arg Ser Lys Gly Arg Ser Cys Ile Val Ala

tgtatgggtg gacgaaccac aggaagtgtt gtgcgcactg tatcatcacg cggcgcgcgg 812

cgctccctgc actatatcac gccatttatg tctttcttct agcactatct cctttttcgc 872

gccagctgct gatatccgca cggtttctctg ccaacacata ccagtggaaac tcgaggatcc 932

tgaccatttt gctactcgtc acgaccaccc ttgcctcaca ccccttttgt gttgactctc 992

aggttctgta attcgacgac ctgctcttcg aatttcgctc ccctttgccc acatagcaca 1052

tatagtatca ccgtgacgaa ctgtatcctc cttgacga 1090

<210> 364

<211> 196

<212> PRT

<213> Schizophyllum commune

<400> 364

Met Gln Ala Ile Lys Cys Val Val Val Gly Asp Gly Ala Val Gly Lys
 1 5 10 15
 Thr Cys Leu Leu Ile Ser Tyr Thr Thr Asn Ala Phe Pro Gly Glu Tyr
 20 25 30
 Ile Pro Thr Val Phe Asp Asn Tyr Ser Ala Asn Val Met Val Asp Gly
 35 40 45
 Lys Thr Ile Ser Leu Gly Leu Trp Asp Thr Ala Gly Gln Glu Asp Tyr
 50 55 60
 Asp Arg Leu Arg Pro Leu Ser Tyr Pro Gln Thr Asp Val Phe Leu Ile
 65 70 75 80
 Cys Phe Ser Leu Val Ser Pro Pro Ser Phe Glu Asn Val Arg Thr Lys
 85 90 95
 Trp Tyr Pro Glu Ile Ser His His Ala Pro Gln Thr Pro Val Val Leu
 100 105 110
 Val Gly Thr Lys Leu Asp Leu Arg Glu Asp Pro Ala Thr Ile Glu Lys
 115 120 125
 Leu Arg Asp Arg Arg Met Ser Pro Ile Gln Tyr Ser Gln Gly Val Ala
 130 135 140
 Met Met Lys Asp Ile Gly Ala Val Lys Tyr Leu Glu Cys Ser Ala Leu
 145 150 155 160
 Thr Gln Lys Gly Leu Lys Thr Val Phe Asp Glu Ala Ile Arg Val Val
 165 170 175
 Leu Tyr Pro Ser Ala Arg Ser Asp Asn Lys Arg Ser Lys Gly Arg Ser
 180 185 190
 Cys Ile Val Ala
 195

<210> 365

<211> 576

<212> DNA

<213> Paracoccidioides brasiliensis

<220>

<221> CDS

<222> (1)..(576)

<400> 365

atg gct gag att cgt cgt aaa ctt gtc att gtt ggt gat ggt gcc tgt 48
 Met Ala Glu Ile Arg Arg Lys Leu Val Ile Val Gly Asp Gly Ala Cys
 1 5 10 15
 ggt aaa act tgt ctc ttg att gtc ttt tcc aag ggt acc ttc cct gag 96
 Gly Lys Thr Cys Leu Leu Ile Val Phe Ser Lys Gly Thr Phe Pro Glu
 20 25 30
 gtc tac gtc cca acc gtc ttc gag aac tat gtg gcc gac gtt gag gtc 144
 Val Tyr Val Pro Thr Val Phe Glu Asn Tyr Val Ala Asp Val Glu Val
 35 40 45
 gat gga aag cat gtc gag ctc gca ctt tgg gat acg gct ggc cag gaa 192
 Asp Gly Lys His Val Glu Leu Ala Leu Trp Asp Thr Ala Gly Gln Glu
 50 55 60
 gat tac gat cga ctc aga cct ctt tcc tac cct gat tca cat gtt att 240
 Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Asp Ser His Val Ile
 65 70 75 80
 ctg atc tgt ttc gct atc gat tcc ccc gac tct ctc gac aac gtc cag 288
 Leu Ile Cys Phe Ala Ile Asp Ser Pro Asp Ser Leu Asp Asn Val Gln
 85 90 95
 gag aag tgg att tct gaa gtc ctt cat ttc tgc cag ggt cat ccc att 336
 Glu Lys Trp Ile Ser Glu Val Leu His Phe Cys Gln Gly His Pro Ile
 100 105 110
 atc ctc gtt ggt tgc aag aaa gat ctt cgt gac gac ccc aga acg att 384
 Ile Leu Val Gly Cys Lys Lys Asp Leu Arg Asp Asp Pro Arg Thr Ile
 115 120 125
 gag gag ctg cgc aag acg tct cag aag ccc gtg acc acc gaa cag ggt 432
 Glu Glu Leu Arg Lys Thr Ser Gln Lys Pro Val Thr Thr Glu Gln Gly
 130 135 140
 gag gag gtc cgc aag aag att ggc gct tac aag tat ctg gaa tgc tcc 480
 Glu Glu Val Arg Lys Lys Ile Gly Ala Tyr Lys Tyr Leu Glu Cys Ser

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145	150	155	160	
gcc cga aca aac gac gga gtt cgt gag gtg ttc gag tca gct act cga				528
Ala Arg Thr Asn Asp Gly Val Arg Glu Val Phe Glu Ser Ala Thr Arg				
	165	170	175	
gct gca ctg ctg gcg aag aag gag aaa aag aaa tgc aag atc ttg				573
Ala Ala Leu Leu Ala Lys Lys Glu Lys Lys Lys Cys Lys Ile Leu				
	180	185	190	
taa				576

<210> 366

<211> 191

<212> PRT

<213> Paracoccidioides brasiliensis

<400> 366

Met	Ala	Glu	Ile	Arg	Arg	Lys	Leu	Val	Ile	Val	Gly	Asp	Gly	Ala	Cys
1				5					10					15	
Gly	Lys	Thr	Cys	Leu	Leu	Ile	Val	Phe	Ser	Lys	Gly	Thr	Phe	Pro	Glu
			20					25					30		
Val	Tyr	Val	Pro	Thr	Val	Phe	Glu	Asn	Tyr	Val	Ala	Asp	Val	Glu	Val
			35				40					45			
Asp	Gly	Lys	His	Val	Glu	Leu	Ala	Leu	Trp	Asp	Thr	Ala	Gly	Gln	Glu
	50					55				60					
Asp	Tyr	Asp	Arg	Leu	Arg	Pro	Leu	Ser	Tyr	Pro	Asp	Ser	His	Val	Ile
	65				70					75				80	
Leu	Ile	Cys	Phe	Ala	Ile	Asp	Ser	Pro	Asp	Ser	Leu	Asp	Asn	Val	Gln
			85					90					95		
Glu	Lys	Trp	Ile	Ser	Glu	Val	Leu	His	Phe	Cys	Gln	Gly	His	Pro	Ile
			100					105					110		
Ile	Leu	Val	Gly	Cys	Lys	Lys	Asp	Leu	Arg	Asp	Asp	Pro	Arg	Thr	Ile
		115					120					125			
Glu	Glu	Leu	Arg	Lys	Thr	Ser	Gln	Lys	Pro	Val	Thr	Thr	Glu	Gln	Gly
	130					135					140				
Glu	Glu	Val	Arg	Lys	Lys	Ile	Gly	Ala	Tyr	Lys	Tyr	Leu	Glu	Cys	Ser
	145				150					155				160	
Ala	Arg	Thr	Asn	Asp	Gly	Val	Arg	Glu	Val	Phe	Glu	Ser	Ala	Thr	Arg
			165					170						175	
Ala	Ala	Leu	Leu	Ala	Lys	Lys	Glu	Lys	Lys	Lys	Cys	Lys	Ile	Leu	
			180					185						190	

<210> 367

<211> 591

<212> DNA

<213> Fucus distichus

<220>

<221> CDS

<222> (1)..(591)

<400> 367

atg	cag	aac	ata	aag	tgc	gtc	gtc	gtg	ggt	gac	ggt	gcg	gtt	ggt	aaa
Met	Gln	Asn	Ile	Lys	Cys	Val	Val	Val	Gly	Asp	Gly	Ala	Val	Gly	Lys
1				5					10					15	
acc	tgc	ctc	ctc	atc	tcc	tac	acg	acg	aac	gcg	ttt	cct	ggg	gaa	tac
Thr	Cys	Leu	Leu	Ile	Ser	Tyr	Thr	Thr	Asn	Ala	Phe	Pro	Gly	Glu	Tyr
			20					25					30		
atc	cca	act	gtc	ttc	gac	aac	tat	agc	gct	aat	gta	atg	gtc	gac	gga
Ile	Pro	Thr	Val	Phe	Asp	Asn	Tyr	Ser	Ala	Asn	Val	Met	Val	Asp	Gly
		35					40				45				
aag	ccg	atc	aac	ctg	ggc	ctt	tgg	gat	act	gca	ggg	cag	gaa	gat	tac
Lys	Pro	Ile	Asn	Leu	Gly	Leu	Trp	Asp	Thr	Ala	Gly	Gln	Glu	Asp	Tyr
		50				55					60				
gat	cga	ctc	cgg	cca	ctg	agc	tac	ccg	caa	acg	gac	gta	ttt	ctt	gtg
Asp	Arg	Leu	Arg	Pro	Leu	Ser	Tyr	Pro	Gln	Thr	Asp	Val	Phe	Leu	Val
				70						75				80	

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tgc ttc agc gtc gtt gac ccc acc agc ttt cac aac gtg aag ctc aag      288
Cys Phe Ser Val Val Asp Pro Thr Ser Phe His Asn Val Lys Leu Lys
      85      90      95
tgg ata ccc gag ctg caa cac cat gct ccg ggc atc cca ttt ata ctg      336
Trp Ile Pro Glu Leu Gln His His Ala Pro Gly Ile Pro Phe Ile Leu
      100      105      110
gtt ggt acg aag ctc gac ctg agg gat gat caa gac gcg atc aag cgt      384
Val Gly Thr Lys Leu Asp Leu Arg Asp Asp Gln Asp Ala Ile Lys Arg
      115      120      125
cta gca gaa cgt cgg cag acg ccc atc agc ttc agc gag gcg cag ggt      432
Leu Ala Glu Arg Arg Gln Thr Pro Ile Ser Phe Ser Glu Ala Gln Gly
      130      135      140
ctg tcg tct gac ctt gaa gct tac cgc tac ctt gag tgc agc gcg ctg      480
Leu Ser Ser Asp Leu Glu Ala Tyr Arg Tyr Leu Glu Cys Ser Ala Leu
      145      150      155      160
acg caa cac ggg tta aaa cag gtg ttt gac ggg gct atc cgg tgt gtt      528
Thr Gln His Gly Leu Lys Gln Val Phe Asp Gly Ala Ile Arg Cys Val
      165      170      175
cta gaa cag aac cag aga aag atg aaa aag aaa aag ggc aag aaa ggc      576
Leu Glu Gln Asn Gln Arg Lys Met Lys Lys Lys Lys Gly Lys Lys Gly
      180      185      190
tgc gtc atc tct tga      591
Cys Val Ile Ser
      195

```

<210> 368

<211> 196

<212> PRT

<213> Fucus distichus

<400> 368

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Met Gln Asn Ile Lys Cys Val Val Val Gly Asp Gly Ala Val Gly Lys
1      5      10      15
Thr Cys Leu Leu Ile Ser Tyr Thr Thr Asn Ala Phe Pro Gly Glu Tyr
      20      25      30
Ile Pro Thr Val Phe Asp Asn Tyr Ser Ala Asn Val Met Val Asp Gly
      35      40      45
Lys Pro Ile Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln Glu Asp Tyr
      50      55      60
Asp Arg Leu Arg Pro Leu Ser Tyr Pro Gln Thr Asp Val Phe Leu Val
65      70      75      80
Cys Phe Ser Val Val Asp Pro Thr Ser Phe His Asn Val Lys Leu Lys
      85      90      95
Trp Ile Pro Glu Leu Gln His His Ala Pro Gly Ile Pro Phe Ile Leu
      100      105      110
Val Gly Thr Lys Leu Asp Leu Arg Asp Asp Gln Asp Ala Ile Lys Arg
      115      120      125
Leu Ala Glu Arg Arg Gln Thr Pro Ile Ser Phe Ser Glu Ala Gln Gly
      130      135      140
Leu Ser Ser Asp Leu Glu Ala Tyr Arg Tyr Leu Glu Cys Ser Ala Leu
145      150      155      160
Thr Gln His Gly Leu Lys Gln Val Phe Asp Gly Ala Ile Arg Cys Val
      165      170      175
Leu Glu Gln Asn Gln Arg Lys Met Lys Lys Lys Gly Lys Lys Gly
      180      185      190
Cys Val Ile Ser
      195

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<210> 369

<211> 636

<212> DNA

<213> Homo sapiens

<220>

<221> CDS

<222> (1)..(636)

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<400> 369
 atg cag gcc atc aag tgt gtg gtg gtg gga gac gga gct gta ggt aaa 48.
 Met Gln Ala Ile Lys Cys Val Val Val Gly Asp Gly Ala Val Gly Lys
 1 5 10 15
 act tgc cta ctg atc agt tac aca acc aat gca ttt cct gga gaa tat 96
 Thr Cys Leu Leu Ile Ser Tyr Thr Thr Asn Ala Phe Pro Gly Glu Tyr
 20 25 30
 atc cct act gtc ttt gac aat tat tct gcc aat gtt atg gta gat gga 144
 Ile Pro Thr Val Phe Asp Asn Tyr Ser Ala Asn Val Met Val Asp Gly
 35 40 45
 aaa ccg gtg aat ctg ggc tta tgg gat aca gct gga caa gaa gat tat 192
 Lys Pro Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln Glu Asp Tyr
 50 55 60
 gac aga tta cgc ccc cta tcc tat ccg caa aca gtt gga gaa acg tac 240
 Asp Arg Leu Arg Pro Leu Ser Tyr Pro Gln Thr Val Gly Glu Thr Tyr
 65 70 75 80
 ggt aag gat ata acc tcc cgg ggc aaa gac aag ccg att gcc gat gtg 288
 Gly Lys Asp Ile Thr Ser Arg Gly Lys Asp Lys Pro Ile Ala Asp Val
 85 90 95
 ttc tta att tgc ttt tcc ctt gtg agt cct gca tca ttt gaa aat gtc 336
 Phe Leu Ile Cys Phe Ser Leu Val Ser Pro Ala Ser Phe Glu Asn Val
 100 105 110
 cgt gca aag tgg tat cct gag gtg cgg cac cac tgt ccc aac act ccc 384
 Arg Ala Lys Trp Tyr Pro Glu Val Arg His His Cys Pro Asn Thr Pro
 115 120 125
 atc atc cta gtg gga act aaa ctt gat ctt agg gat gat aaa gac acg 432
 Ile Ile Leu Val Gly Thr Lys Leu Asp Leu Arg Asp Asp Lys Asp Thr
 130 135 140
 atc gag aaa ctg aag gag aag aag ctg act ccc atc acc tat ccg cag 480
 Ile Glu Lys Leu Lys Glu Lys Lys Leu Thr Pro Ile Thr Tyr Pro Gln
 145 150 155 160
 ggt cta gcc atg gct aag gag att ggt gct gta aaa tac ctg gag tgc 528
 Gly Leu Ala Met Ala Lys Glu Ile Gly Ala Val Lys Tyr Leu Glu Cys
 165 170 175
 tcg gcg ctc aca cag cga ggc ctc aag aca gtg ttt gac gaa gcg atc 576
 Ser Ala Leu Thr Gln Arg Gly Leu Lys Thr Val Phe Asp Glu Ala Ile
 180 185 190
 cga gca gtc ctc tgc ccg cct ccc gtg aag aag agg aag aga aaa tgc 624
 Arg Ala Val Leu Cys Pro Pro Pro Val Lys Lys Arg Lys Arg Lys Cys
 195 200 205
 ctg ctg ttg taa 636
 Leu Leu Leu
 210

<210> 370

<211> 211

<212> PRT

<213> Homo sapiens

<400> 370

Met Gln Ala Ile Lys Cys Val Val Val Gly Asp Gly Ala Val Gly Lys
 1 5 10 15
 Thr Cys Leu Leu Ile Ser Tyr Thr Thr Asn Ala Phe Pro Gly Glu Tyr
 20 25 30
 Ile Pro Thr Val Phe Asp Asn Tyr Ser Ala Asn Val Met Val Asp Gly
 35 40 45
 Lys Pro Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln Glu Asp Tyr
 50 55 60
 Asp Arg Leu Arg Pro Leu Ser Tyr Pro Gln Thr Val Gly Glu Thr Tyr
 65 70 75 80
 Gly Lys Asp Ile Thr Ser Arg Gly Lys Asp Lys Pro Ile Ala Asp Val
 85 90 95
 Phe Leu Ile Cys Phe Ser Leu Val Ser Pro Ala Ser Phe Glu Asn Val
 100 105 110
 Arg Ala Lys Trp Tyr Pro Glu Val Arg His His Cys Pro Asn Thr Pro
 115 120 125
 Ile Ile Leu Val Gly Thr Lys Leu Asp Leu Arg Asp Asp Lys Asp Thr

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130 135 140
 Ile Glu Lys Leu Lys Glu Lys Lys Leu Thr Pro Ile Thr Tyr Pro Gln
 145 150 155 160
 Gly Leu Ala Met Ala Lys Glu Ile Gly Ala Val Lys Tyr Leu Glu Cys
 165 170 175
 Ser Ala Leu Thr Gln Arg Gly Leu Lys Thr Val Phe Asp Glu Ala Ile
 180 185 190
 Arg Ala Val Leu Cys Pro Pro Pro Val Lys Lys Arg Lys Arg Lys Cys
 195 200 205
 Leu Leu Leu
 210

<210> 371

<211> 576

<212> DNA

<213> *Pneumocystis carinii*

<220>

<221> CDS

<222> (1) .. (576)

<400> 371

atg	caa	act	att	aaa	tgt	gtc	ggt	ggt	ggg	gat	ggc	gcg	ggt	ggt	aaa	48
Met	Gln	Thr	Ile	Lys	Cys	Val	Val	Val	Gly	Asp	Gly	Ala	Val	Gly	Lys	
1				5					10					15		
acg	tgt	ctt	tta	ata	tcc	tat	acg	aca	aac	aaa	ttt	cct	tca	gaa	tat	96
Thr	Cys	Leu	Leu	Ile	Ser	Tyr	Thr	Thr	Asn	Lys	Phe	Pro	Ser	Glu	Tyr	
			20					25					30			
ggt	cct	act	gta	ttt	gat	aat	tat	gcg	ggt	acc	gta	atg	att	gga	gaa	144
Val	Pro	Thr	Val	Phe	Asp	Asn	Tyr	Ala	Val	Thr	Val	Met	Ile	Gly	Glu	
			35				40					45				
gaa	cct	tat	act	tta	gga	ctt	ttt	gat	aca	gca	ggt	caa	gaa	gat	tat	192
Glu	Pro	Tyr	Thr	Leu	Gly	Leu	Phe	Asp	Thr	Ala	Gly	Gln	Glu	Asp	Tyr	
	50					55					60					
gac	aga	ttg	cgt	ccc	tta	tca	tat	cca	caa	acg	gat	ggt	ttt	ctt	att	240
Asp	Arg	Leu	Arg	Pro	Leu	Ser	Tyr	Pro	Gln	Thr	Asp	Val	Phe	Leu	Ile	
	65				70				75					80		
tgc	ttt	tct	ggt	act	agt	cca	gca	agt	ttt	gaa	aat	gta	aga	gaa	aag	288
Cys	Phe	Ser	Val	Thr	Ser	Pro	Ala	Ser	Phe	Glu	Asn	Val	Arg	Glu	Lys	
			85					90					95			
tgg	cat	cca	gag	ggt	cgt	cat	cat	tgt	cca	gga	aca	ccc	tgt	ctt	att	336
Trp	His	Pro	Glu	Val	Arg	His	His	Cys	Pro	Gly	Thr	Pro	Cys	Leu	Ile	
			100					105					110			
ggt	ggt	aca	caa	atc	gat	tta	cga	gat	gat	cct	atg	att	gta	gag	aaa	384
Val	Gly	Thr	Gln	Ile	Asp	Leu	Arg	Asp	Asp	Pro	Met	Ile	Val	Glu	Lys	
			115				120					125				
ctc	agt	cga	caa	aga	caa	acc	ccc	att	aca	aaa	gaa	tta	ggt	gaa	aaa	432
Leu	Ser	Arg	Gln	Arg	Gln	Pro	Ile	Thr	Lys	Glu	Leu	Gly	Glu	Lys		
	130					135					140					
ctt	tca	aaa	gaa	ttg	ggt	gct	gta	aaa	tat	ggt	gag	tgc	tca	gct	ttg	480
Leu	Ser	Lys	Glu	Leu	Gly	Ala	Val	Lys	Tyr	Val	Glu	Cys	Ser	Ala	Leu	
	145				150					155					160	
act	caa	aaa	gga	tta	aaa	aac	ggt	ttt	gat	gaa	gct	ata	ggt	tgc	gca	528
Thr	Gln	Lys	Gly	Leu	Lys	Asn	Val	Phe	Asp	Glu	Ala	Ile	Val	Cys	Ala	
			165						170					175		
ctt	gaa	cca	ccc	ggt	acg	aag	aag	aaa	act	aaa	tgt	ctt	att	tta		573
Leu	Glu	Pro	Pro	Val	Thr	Lys	Lys	Lys	Thr	Lys	Cys	Leu	Ile	Leu		
			180					185					190			
taa																576

<210> 372

<211> 191

<212> PRT

<213> *Pneumocystis carinii*

<400> 372

Met Gln Thr Ile Lys Cys Val Val Val Gly Asp Gly Ala Val Gly Lys
 1 5 10 15
 Thr Cys Leu Leu Ile Ser Tyr Thr Thr Asn Lys Phe Pro Ser Glu Tyr
 20 25 30
 Val Pro Thr Val Phe Asp Asn Tyr Ala Val Thr Val Met Ile Gly Glu
 35 40 45
 Glu Pro Tyr Thr Leu Gly Leu Phe Asp Thr Ala Gly Gln Glu Asp Tyr
 50 55 60
 Asp Arg Leu Arg Pro Leu Ser Tyr Pro Gln Thr Asp Val Phe Leu Ile
 65 70 75 80
 Cys Phe Ser Val Thr Ser Pro Ala Ser Phe Glu Asn Val Arg Glu Lys
 85 90 95
 Trp His Pro Glu Val Arg His His Cys Pro Gly Thr Pro Cys Leu Ile
 100 105 110
 Val Gly Thr Gln Ile Asp Leu Arg Asp Asp Pro Met Ile Val Glu Lys
 115 120 125
 Leu Ser Arg Gln Arg Gln Thr Pro Ile Thr Lys Glu Leu Gly Glu Lys
 130 135 140
 Leu Ser Lys Glu Leu Gly Ala Val Lys Tyr Val Glu Cys Ser Ala Leu
 145 150 155 160
 Thr Gln Lys Gly Leu Lys Asn Val Phe Asp Glu Ala Ile Val Cys Ala
 165 170 175
 Leu Glu Pro Pro Val Thr Lys Lys Lys Thr Lys Cys Leu Ile Leu
 180 185 190

<210> 373

<211> 630

<212> DNA

<213> *Ashbya gossypii*

<220>

<221> CDS

<222> (1)..(630)

<400> 373

atg gcg tac cag aca ggc ggc aac ata cgc aag aag ttg gtt att gtc	48
Met Ala Tyr Gln Thr Gly Gly Asn Ile Arg Lys Lys Leu Val Ile Val	
1 5 10 15	
ggc gac ggg gcg tgt ggg aag acg tgt ctg ctc gtt gtg ttc tcc aaa	96
Gly Asp Gly Ala Cys Gly Lys Thr Cys Leu Leu Val Val Phe Ser Lys	
20 25 30	
ggg cag ttc ccg gag atc cat gtg ccc acg gtg ttc gag aac tac gtg	144
Gly Gln Phe Pro Glu Ile His Val Pro Thr Val Phe Glu Asn Tyr Val	
35 40 45	
gca gat gtg gac atc gac ggg cga cgc gta gag ctg gca ctg tgg gat	192
Ala Asp Val Asp Ile Asp Gly Arg Arg Val Glu Leu Ala Leu Trp Asp	
50 55 60	
aca gcg ggc cag gag gac tac gac cgg ctg cgg cca ttg tcg tac ccg	240
Thr Ala Gly Gln Glu Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro	
65 70 75 80	
gat tcc aat gtg gtg ctt atc tgt ttc tct gtg gac cta cct gac tcg	288
Asp Ser Asn Val Val Leu Ile Cys Phe Ser Val Asp Leu Pro Asp Ser	
85 90 95	
ctg gac aat gtg cag gag aag tgg gtc agc gaa gtt ctg cac ttc tgc	336
Leu Asp Asn Val Gln Glu Lys Trp Val Ser Glu Val Leu His Phe Cys	
100 105 110	
cag ggc gtg cca att tta ctg gta ggc tgc aag gtg gat ctg aga aac	384
Gln Gly Val Pro Ile Leu Leu Val Gly Cys Lys Val Asp Leu Arg Asn	
115 120 125	
gac cct cag gtg ctc cag cag ctg cag gcc gag ggc cag cgc ccc gtg	432
Asp Pro Gln Val Leu Gln Gln Leu Gln Ala Glu Gly Gln Arg Pro Val	
130 135 140	
acc gcc gca gag ggc tca gcc gtc gcc ggt aag ata ggc gcc gtc gcc	480
Thr Ala Ala Glu Gly Ser Ala Val Ala Gly Lys Ile Gly Ala Val Ala	
145 150 155 160	
tac ctc gag tgc tct gcg cgc aca ggc cag ggt gtg aag gag gtt ttc	528
Tyr Leu Glu Cys Ser Ala Arg Thr Gly Gln Gly Val Lys Glu Val Phe	

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	165		170		175		
gac act gcg acc cgc gcc gca ctc tct ggc aag ccc gcc gcg tct gca							576
Asp Thr Ala Thr Arg Ala Ala Leu Ser Gly Lys Pro Ala Ala Ser Ala							
	180		185		190		
ggc aag aag aag gtc cac ggt gac aag aag aag aag aaa tgt ctg gtc							624
Gly Lys Lys Lys Val His Gly Asp Lys Lys Lys Lys Lys Cys Leu Val							
	195		200		205		
ctg tga							630
Leu							

<210> 374

<211> 209

<212> PRT

<213> Ashbya gossypii

<400> 374

Met Ala Tyr Gln Thr Gly Gly Asn Ile Arg Lys Lys Leu Val Ile Val							
1 5 10 15							
Gly Asp Gly Ala Cys Gly Lys Thr Cys Leu Leu Val Val Phe Ser Lys							
20 25 30							
Gly Gln Phe Pro Glu Ile His Val Pro Thr Val Phe Glu Asn Tyr Val							
35 40 45							
Ala Asp Val Asp Ile Asp Gly Arg Arg Val Glu Leu Ala Leu Trp Asp							
50 55 60							
Thr Ala Gly Gln Glu Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro							
65 70 75 80							
Asp Ser Asn Val Val Leu Ile Cys Phe Ser Val Asp Leu Pro Asp Ser							
85 90 95							
Leu Asp Asn Val Gln Glu Lys Trp Val Ser Glu Val Leu His Phe Cys							
100 105 110							
Gln Gly Val Pro Ile Leu Leu Val Gly Cys Lys Val Asp Leu Arg Asn							
115 120 125							
Asp Pro Gln Val Leu Gln Gln Leu Gln Ala Glu Gly Gln Arg Pro Val							
130 135 140							
Thr Ala Ala Glu Gly Ser Ala Val Ala Gly Lys Ile Gly Ala Val Ala							
145 150 155 160							
Tyr Leu Glu Cys Ser Ala Arg Thr Gly Gln Gly Val Lys Glu Val Phe							
165 170 175							
Asp Thr Ala Thr Arg Ala Ala Leu Ser Gly Lys Pro Ala Ala Ser Ala							
180 185 190							
Gly Lys Lys Lys Val His Gly Asp Lys Lys Lys Lys Lys Cys Leu Val							
195 200 205							
Leu							

<210> 375

<211> 564

<212> DNA

<213> Ashbya gossypii

<220>

<221> CDS

<222> (1)..(564)

<400> 375

atg acg gtc aac gtt gtg aga cgg aag ttg gta atc ata ggg gat ggg							
Met Thr Val Asn Val Val Arg Arg Lys Leu Val Ile Ile Gly Asp Gly							48
1 5 10 15							
gca tgc ggc aag acg tcg tta cta cat gtg ttc acg ctg ggg aag ttc							
Ala Cys Gly Lys Thr Ser Leu Leu His Val Phe Thr Leu Gly Lys Phe							96
20 25 30							
cct gag gaa tat ctg ccc acg gtt ttc gag aac tac gtt acg gat tgc							
Pro Glu Glu Tyr Leu Pro Thr Val Phe Glu Asn Tyr Val Thr Asp Cys							144
35 40 45							
cgt gta gac ggc ata aaa gtg cag ttg gcg cta tgg gat act gct ggt							
Arg Val Asp Gly Ile Lys Val Gln Leu Ala Leu Trp Asp Thr Ala Gly							192

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50	55	60	
cag gaa gaa tac gag cgt ctg cgc ccc atg tcc tac tcg aag gcg gac			240
Gln Glu Glu Tyr Glu Arg Leu Arg Pro Met Ser Tyr Ser Lys Ala Asp			
65	70	75	80
atc ata tta atc ggg ttt gcc ata gac gac ccg ggg tcg ttg tcc aat			288
Ile Ile Leu Ile Gly Phe Ala Ile Asp Asp Pro Gly Ser Leu Ser Asn			
85	90	95	
gcg cgg gag aag tgg acg gtc gag gcg ctg cgc tac tgt ccc aac gcc			336
Ala Arg Glu Lys Trp Thr Val Glu Ala Leu Arg Tyr Cys Pro Asn Ala			
100	105	110	
ccg atc atc ctc gtg ggg ctc aaa aag gac ctt cgc cgc ccc ggg acg			384
Pro Ile Ile Leu Val Gly Leu Lys Lys Asp Leu Arg Arg Pro Gly Thr			
115	120	125	
cag tgc gcg atg gta gcg cct tcg cag gca caa gag gtg gtg cgc gcc			432
Gln Cys Ala Met Val Ala Pro Ser Gln Ala Gln Glu Val Val Arg Ala			
130	135	140	
atc ggc gca aag aaa tac atg gag tgc agc gca ctt acg ggg gag ggc			480
Ile Gly Ala Lys Lys Tyr Met Glu Cys Ser Ala Leu Thr Gly Glu Gly			
145	150	155	160
gtg gac gat gtg ttc gag ctg gcc acg aga aca agt ctt ctg gtg aac			528
Val Asp Asp Val Phe Glu Leu Ala Thr Arg Thr Ser Leu Leu Val Asn			
165	170	175	
aag gag ccg ggt caa ggc tgt tgc att atc tca tga			564
Lys Glu Pro Gly Gln Gly Cys Cys Ile Ile Ser			
180	185		

<210> 376

<211> 187

<212> PRT

<213> *Ashbya gossypii*

<400> 376

Met Thr Val Asn Val Val Arg Arg Lys Leu Val Ile Ile Gly Asp Gly	
1	5
Ala Cys Gly Lys Thr Ser Leu Leu His Val Phe Thr Leu Gly Lys Phe	10
20	25
Pro Glu Glu Tyr Leu Pro Thr Val Phe Glu Asn Tyr Val Thr Asp Cys	30
35	40
Arg Val Asp Gly Ile Lys Val Gln Leu Ala Leu Trp Asp Thr Ala Gly	45
50	55
Gln Glu Glu Tyr Glu Arg Leu Arg Pro Met Ser Tyr Ser Lys Ala Asp	60
65	70
Ile Ile Leu Ile Gly Phe Ala Ile Asp Asp Pro Gly Ser Leu Ser Asn	75
85	90
Ala Arg Glu Lys Trp Thr Val Glu Ala Leu Arg Tyr Cys Pro Asn Ala	95
100	105
Pro Ile Ile Leu Val Gly Leu Lys Lys Asp Leu Arg Arg Pro Gly Thr	110
115	120
Gln Cys Ala Met Val Ala Pro Ser Gln Ala Gln Glu Val Val Arg Ala	125
130	135
Ile Gly Ala Lys Lys Tyr Met Glu Cys Ser Ala Leu Thr Gly Glu Gly	140
145	150
Val Asp Asp Val Phe Glu Leu Ala Thr Arg Thr Ser Leu Leu Val Asn	155
165	170
Lys Glu Pro Gly Gln Gly Cys Cys Ile Ile Ser	175
180	185

<210> 377

<211> 1043

<212> DNA

<213> *Tigriopus japonicus*

<220>

<221> CDS

<222> (264)..(842)

<400> 377

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aggaggagac gccttggttg aaatccatcc aacaacctgg gactctctgc tccagcagca 60

agcatcacca ccccatcac catcatcttc atcctgatca acacccttga gatccagatc 120

cccatccatc gatccaccca tcttgaggat tgactcacac acctcgaaga ttgtgggctg 180

tgaaaaacca gtgtggggtc ggcccttgcg tgcgtgaggt ggggtggttg tgaaacccga 240

ctggcctgac cattgtcgtc tgc atg gcg gct att cgc aag aaa tta gtg att 293
Met Ala Ala Ile Arg Lys Lys Leu Val Ile

gtg ggc gat ggc gcc tgc ggc aag acc tgc ctc ttg atc gtg ttc tcc 341
Val Gly Asp Gly Ala Cys Gly Lys Thr Cys Leu Leu Ile Val Phe Ser

aag gat caa ttc ccc gag gtg tat gtg ccc aca gtg ttc gaa aac tac 389
Lys Asp Gln Phe Pro Glu Val Tyr Val Pro Thr Val Phe Glu Asn Tyr

gtg gct gac atc gaa gtg gac ggc aag caa gtg gaa ctg gcc ttg tgg 437
Val Ala Asp Ile Glu Val Asp Gly Lys Gln Val Glu Leu Ala Leu Trp

gat acg gcc ggt cag gag gac tac gat cga ctc cga ccc ctg tcc tat 485
Asp Thr Ala Gly Gln Glu Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr

ccg gat acg gat gtg atc ctg atg tgt ttc tgc atc gac tgc ccc gat 533
Pro Asp Thr Asp Val Ile Leu Met Cys Phe Ser Ile Asp Ser Pro Asp

tgc cct aat gtg ccc att atc ctc gtg gga aac aaa aaa gac ttg cgc 629
Cys Pro Asn Val Pro Ile Ile Leu Val Gly Asn Lys Lys Asp Leu Arg

aat gat ccc aat acc atc aag gag ttg ggc aag atg aaa caa gaa ccg 677
Asn Asp Pro Asn Thr Ile Lys Glu Leu Gly Lys Met Lys Gln Glu Pro

gtc aag ccg gaa gag ggt cgc aca atg gcc gaa aag atc aac gcc ttc 725
Val Lys Pro Glu Glu Gly Arg Thr Met Ala Glu Lys Ile Asn Ala Phe

gcc tac ctc gag tgt tgc gcc aag agc aag gaa ggc gtc aga gaa gtc 773
Ala Tyr Leu Glu Cys Ser Ala Lys Ser Lys Glu Gly Val Arg Glu Val

ttt gag aca gcc acc cga gcg gca tta cag gtc aag aag aaa aag aag 821
Phe Glu Thr Ala Thr Arg Ala Ala Leu Gln Val Lys Lys Lys Lys Lys

aag cct tgc gtt ctc ttt taatgtcgga aaccaaacca tttttcctat 869
Lys Pro Cys Val Leu Phe

tcttattacc tatcttcac atcaacatca acatccttca accacaaata caactacaac 929

tattactata cttctactac tatggacgag atcttaattt agtcgcaatt atcaattggg 989

gaaattttacg gaataaaaca gaccctgaga acaaaaaaaaa aaaaaaaaaa aaaa 1043

<210> 378

<211> 192

<212> PRT

<213> Tigriopus japonicus

<400> 378

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Met Ala Ala Ile Arg Lys Lys Leu Val Ile Val Gly Asp Gly Ala Cys
 1 5 10 15
 Gly Lys Thr Cys Leu Leu Ile Val Phe Ser Lys Asp Gln Phe Pro Glu
 20 25 30
 Val Tyr Val Pro Thr Val Phe Glu Asn Tyr Val Ala Asp Ile Glu Val
 35 40 45
 Asp Gly Lys Gln Val Glu Leu Ala Leu Trp Asp Thr Ala Gly Gln Glu
 50 55 60
 Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Asp Thr Asp Val Ile
 65 70 75 80
 Leu Met Cys Phe Ser Ile Asp Ser Pro Asp Ser Leu Glu Asn Ile Pro
 85 90 95
 Glu Lys Trp Thr Pro Glu Val Lys His Phe Cys Pro Asn Val Pro Ile
 100 105 110
 Ile Leu Val Gly Asn Lys Lys Asp Leu Arg Asn Asp Pro Asn Thr Ile
 115 120 125
 Lys Glu Leu Gly Lys Met Lys Gln Glu Pro Val Lys Pro Glu Glu Gly
 130 135 140
 Arg Thr Met Ala Glu Lys Ile Asn Ala Phe Ala Tyr Leu Glu Cys Ser
 145 150 155 160
 Ala Lys Ser Lys Glu Gly Val Arg Glu Val Phe Glu Thr Ala Thr Arg
 165 170 175
 Ala Ala Leu Gln Val Lys Lys Lys Lys Lys Lys Pro Cys Val Leu Phe
 180 185 190

<210> 379

<211> 1014

<212> DNA

<213> Rhopalosiphum padi

<220>

<221> CDS

<222> (197)..(772)

<400> 379

tcaattgcgt tctgccattt ttttctaccg acgtcgatcc gcgcgtgttg atctgccggg 60

tacactccgt acacaggttg gagatcgctg caggcagcgt tcgattgcga caacgacgac 120

cagcgagaac acttctctag tgctctgtgc tgcttattca ccagtgtaca cgtaggagtg 180

ttcccatagc ggcaac atg cag acc atc aag tgc gtt gtt gtt ggt gat gga 232
 Met Gln Thr Ile Lys Cys Val Val Val Gly Asp Gly
 1 5 10

gct gtc ggt aag act tgt ctg ctc ata tcg tac aca aca aac aaa ttt 280
 Ala Val Gly Lys Thr Cys Leu Leu Ile Ser Tyr Thr Thr Asn Lys Phe
 15 20 25

cct tca gaa tat gta ccg act gtt ttc gac aat tat gca gtg aca gtt 328
 Pro Ser Glu Tyr Val Pro Thr Val Phe Asp Asn Tyr Ala Val Thr Val
 30 35 40

atg att ggt ggg gaa cca tac aca tta ggt tta ttt gat aca gca ggt 376
 Met Ile Gly Gly Glu Pro Tyr Thr Leu Gly Leu Phe Asp Thr Ala Gly
 45 50 55 60

cag gaa gat tat gat cgc ctc aga cct ttg agt tat cca caa act gat 424
 Gln Glu Asp Tyr Asp Arg Leu Arg Pro Leu Ser Tyr Pro Gln Thr Asp
 65 70 75

gtg ttt ctt gtt tgt ttc tct gtg gtt tta cca tct tca ttt gaa aat 472
 Val Phe Leu Val Cys Phe Ser Val Val Leu Pro Ser Ser Phe Glu Asn
 80 85 90

gtc aaa gaa aaa tgg gtt ccg gag ata acg cat cac tgt caa aaa aca 520
 Val Lys Glu Lys Trp Val Pro Glu Ile Thr His Cys Gln Lys Thr
 95 100 105

cca ttc ctg ttg gtt ggc aca caa ata gac ctt aga gaa gat gcc aca 568
 Pro Phe Leu Leu Val Gly Thr Gln Ile Asp Leu Arg Glu Asp Ala Thr
 110 115 120

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act gtg gag aaa cta gcc aaa aat aaa caa aaa tca ata tca ttt gaa      616
Thr Val Glu Lys Leu Ala Lys Asn Lys Gln Lys Ser Ile Ser Phe Glu
125      130      135      140
caa gga gag aag cta gct aaa gaa ctt aaa gct gtg aaa tat gtc gaa      664
Gln Gly Glu Lys Leu Ala Lys Glu Leu Lys Ala Val Lys Tyr Val Glu
      145      150      155
tgc tca gca ctt aca caa aaa gga cta aaa aat gta ttt gat gaa gct      712
Cys Ser Ala Leu Thr Gln Lys Gly Leu Lys Asn Val Phe Asp Glu Ala
      160      165      170
att ctt gca gct tta gag cct cct gaa cca gtt aag aag agg aag tgt      760
Ile Leu Ala Ala Leu Glu Pro Pro Glu Pro Val Lys Lys Arg Lys Cys
      175      180      185
gtt ata ttg taaggctgcg gataaataaa caggtgcgac aattatgtca taaaaatatt      819
Val Ile Leu
190
taagataaaa caatttaaata catgatttag catggataca ataataaaat aataattatt      879
.....
ttgttttttac taatctataa atatatatat ataaataatt tattttatat tttaacaagaa      939

aatatgtgca ttcattgaat aataaataaa taggtttttt atacgccaaa aaaaaaaaaa      999

aaaaaaaaaa aaaaaa      1014

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<210> 380

<211> 191

<212> PRT

<213> Rhopalosiphum padi

<400> 380

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Met Gln Thr Ile Lys Cys Val Val Val Gly Asp Gly Ala Val Gly Lys
1      5      10      15
Thr Cys Leu Leu Ile Ser Tyr Thr Thr Asn Lys Phe Pro Ser Glu Tyr
      20      25      30
Val Pro Thr Val Phe Asp Asn Tyr Ala Val Thr Val Met Ile Gly Gly
      35      40      45
Glu Pro Tyr Thr Leu Gly Leu Phe Asp Thr Ala Gly Gln Glu Asp Tyr
      50      55      60
Asp Arg Leu Arg Pro Leu Ser Tyr Pro Gln Thr Asp Val Phe Leu Val
      65      70      75      80
Cys Phe Ser Val Val Leu Pro Ser Ser Phe Glu Asn Val Lys Glu Lys
      85      90      95
Trp Val Pro Glu Ile Thr His His Cys Gln Lys Thr Pro Phe Leu Leu
      100      105      110
Val Gly Thr Gln Ile Asp Leu Arg Glu Asp Ala Thr Thr Val Glu Lys
      115      120      125
Leu Ala Lys Asn Lys Gln Lys Ser Ile Ser Phe Glu Gln Gly Glu Lys
      130      135      140
Leu Ala Lys Glu Leu Lys Ala Val Lys Tyr Val Glu Cys Ser Ala Leu
      145      150      155      160
Thr Gln Lys Gly Leu Lys Asn Val Phe Asp Glu Ala Ile Leu Ala Ala
      165      170      175
Leu Glu Pro Pro Glu Pro Val Lys Lys Arg Lys Cys Val Ile Leu
      180      185      190

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<210> 381

<211> 679

<212> DNA

<213> Hordeum vulgare var

<220>

<221> CDS

<222> (14) .. (655)

<400> 381

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cgcgcggcga gcc atg gcg tcc agc gcc tcc cgg ttc atc aag tgc gtc      49
      Met Ala Ser Ser Ala Ser Arg Phe Ile Lys Cys Val
      1          5          10
acg gtg ggc gac ggc gcc gtc ggc aag acc tgc atg ctc atc tgc tac      97
Thr Val Gly Asp Gly Ala Val Gly Lys Thr Cys Met Leu Ile Cys Tyr
      15          20          25
acc agc aac aag ttc ccc acc gac tac ata ccc acg gtg ttc gac aat      145
Thr Ser Asn Lys Phe Pro Thr Asp Tyr Ile Pro Thr Val Phe Asp Asn
      30          35          40
ttc agc gcg aac gtg gtg gcg gac ggc acc acg gtg aat ttg ggc ctt      193
Phe Ser Ala Asn Val Val Ala Asp Gly Thr Thr Val Asn Leu Gly Leu
      45          50          55
tgg gac acc gcc ggg cag gag gat tac aac cgg ctg agg cct cta agc      241
Trp Asp Thr Ala Gly Gln Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser
      60          65          70          75
tac cgc ggc gcc gac gtt ttc gtg ctt gcc ttc tcc ctt gtg agc cga      289
Tyr Arg Gly Ala Asp Val Phe Val Leu Ala Phe Ser Leu Val Ser Arg
      80          85          90
gct agc tat gag aat atc atg aag aag tgg ata ccg gag ctt cag cat      337
Ala Ser Tyr Glu Asn Ile Met Lys Lys Trp Ile Pro Glu Leu Gln His
      95          100          105
tac gcg ccc ggc gta cct gtt gtg ctg gta ggc aca aaa ctg gat ctt      385
Tyr Ala Pro Gly Val Pro Val Val Leu Val Gly Thr Lys Leu Asp Leu
      110          115          120
cgt gaa gat aag cac tat ttg ctg gac cac cct ggg atg ata ccc gtt      433
Arg Glu Asp Lys His Tyr Leu Leu Asp His Pro Gly Met Ile Pro Val
      125          130          135          140
acc aca gca cag ggg gag gaa ctt cgt aag caa gtt ggt gct tta tat      481
Thr Thr Ala Gln Gly Glu Glu Leu Arg Lys Gln Val Gly Ala Leu Tyr
      145          150          155
tac ata gag tgc agc tca aag aca caa cag aat gtc aaa gct gtg ttt      529
Tyr Ile Glu Cys Ser Ser Lys Thr Gln Gln Asn Val Lys Ala Val Phe
      160          165          170
gat gct gct atc aag gta gta atc cag ccc cca act aaa caa aga gaa      577
Asp Ala Ala Ile Lys Val Val Ile Gln Pro Pro Thr Lys Gln Arg Glu
      175          180          185
aag aag aaa aag aaa cag cgt cgg gga tgt tct atg atg aac ttc agc      625
Lys Lys Lys Lys Lys Gln Arg Arg Gly Cys Ser Met Met Asn Phe Ser
      190          195          200
gga agg aaa atg cta tgc ttc aaa tcc tgaatgatga aagagaaggt      672
Gly Arg Lys Met Leu Cys Phe Lys Ser
      205          210
tccttgcc      679

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<210> 382

<211> 213

<212> PRT

<213> Hordeum vulgare var

<400> 382

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Met Ala Ser Ser Ala Ser Arg Phe Ile Lys Cys Val Thr Val Gly Asp
1          5          10          15
Gly Ala Val Gly Lys Thr Cys Met Leu Ile Cys Tyr Thr Ser Asn Lys
      20          25          30
Phe Pro Thr Asp Tyr Ile Pro Thr Val Phe Asp Asn Phe Ser Ala Asn
      35          40          45
Val Val Ala Asp Gly Thr Thr Val Asn Leu Gly Leu Trp Asp Thr Ala
      50          55          60
Gly Gln Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala
      65          70          75          80
Asp Val Phe Val Leu Ala Phe Ser Leu Val Ser Arg Ala Ser Tyr Glu
      85          90          95
Asn Ile Met Lys Lys Trp Ile Pro Glu Leu Gln His Tyr Ala Pro Gly

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100	105	110
Val Pro Val Val Leu Val Gly Thr Lys Leu Asp Leu Arg Glu Asp Lys		
115	120	125
His Tyr Leu Leu Asp His Pro Gly Met Ile Pro Val Thr Thr Ala Gln		
130	135	140
Gly Glu Glu Leu Arg Lys Gln Val Gly Ala Leu Tyr Tyr Ile Glu Cys		
145	150	155
Ser Ser Lys Thr Gln Gln Asn Val Lys Ala Val Phe Asp Ala Ala Ile		
165	170	175
Lys Val Val Ile Gln Pro Pro Thr Lys Gln Arg Glu Lys Lys Lys Lys		
180	185	190
Lys Gln Arg Arg Gly Cys Ser Met Met Asn Phe Ser Gly Arg Lys Met		
195	200	205
Leu Cys Phe Lys Ser		
210		

<210> 383

<211> 762

<212> DNA

<213> Hordeum vulgare var

<220>

<221> CDS

<222> (33)..(689)

<400> 383

ggatccgctg gagaggagag gagaggagag ac atg agc ggc gga gcg ggg gcg	53
Met Ser Gly Gly Ala Gly Ala	
1	5
gcg acg gcg gtg agc agg ttc atc aag tgc gtg gcc gtg ggc gac ggc	101
Ala Thr Ala Val Ser Arg Phe Ile Lys Cys Val Ala Val Gly Asp Gly	
10	15
gcc gtg ggc aag acc tgc atg ctc atc tgc tac acc tgc aac aag ttc	149
Ala Val Gly Lys Thr Cys Met Leu Ile Cys Tyr Thr Cys Asn Lys Phe	
25	30
ccc acc gac tac atc ccc acc gtg ttc gac aac ttc agc gcc aat gtc	197
Pro Thr Asp Tyr Ile Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val	
40	45
tcc gtg gac ggg agc atc gtc aac ctc ggc ctc tgg gac acc gca ggt	245
Ser Val Asp Gly Ser Ile Val Asn Leu Gly Leu Trp Asp Thr Ala Gly	
60	65
cag gag gat tac agc agg ctg agg cct ctg agc tac agg gga gcc gat	293
Gln Glu Asp Tyr Ser Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp	
75	80
gtc ttc atc ctc tcc ttc tcc ctc acc agc aga gca agc tat gag aat	341
Val Phe Ile Leu Ser Phe Ser Leu Thr Ser Arg Ala Ser Tyr Glu Asn	
90	95
gtg cac aag aag tgg atg ccg gag ctt cgc cgg tac gcc ccc ggc att	389
Val His Lys Lys Trp Met Pro Glu Leu Arg Arg Tyr Ala Pro Gly Ile	
105	110
cct gta ctg ctt gtt gga acc aag ttg gat ctc cgg gag gat aga gct	437
Pro Val Leu Leu Val Gly Thr Lys Leu Asp Leu Arg Glu Asp Arg Ala	
120	125
tat ctt gct gat cat gca gct gat tcc atc ata aca act gag cag ggt	485
Tyr Leu Ala Asp His Ala Ala Asp Ser Ile Thr Thr Glu Gln Gly	
140	145
gag gat ctt agg aga caa ata ggt gct gtg gca tac ata gaa tgc agc	533
Glu Asp Leu Arg Arg Gln Ile Gly Ala Val Ala Tyr Ile Glu Cys Ser	
155	160
tcc aag aca caa agg aac att aag gct gtt ttc gac acc gca atc aag	581
Ser Lys Thr Gln Arg Asn Ile Lys Ala Val Phe Asp Thr Ala Ile Lys	
170	175
gcg gtt ctt caa cct caa agg cac aag gag gta gcc aga aag gaa act	629
Ala Val Leu Gln Pro Gln Arg His Lys Glu Val Ala Arg Lys Glu Thr	
185	190
cgg aca cgc tct agt cgg tca gta agg cag tac ttc tgt ggg agt tct	677
Arg Thr Arg Ser Ser Arg Ser Val Arg Gln Tyr Phe Cys Gly Ser Ser	
200	205
	210
	215

tgt ttc gcg tagccgagaa gaacattctg gagtctttcc tcgacacgat gctcagatgg 736
Cys Phe Ala

cccgtgggtg ttctccaaat ggggta 762

<210> 384

<211> 218

<212> PRT

<213> Hordeum vulgare var

<400> 384

Met	Ser	Gly	Gly	Ala	Gly	Ala	Ala	Thr	Ala	Val	Ser	Arg	Phe	Ile	Lys
1			5						10					15	
Cys	Val	Ala	Val	Gly	Asp	Gly	Ala	Val	Gly	Lys	Thr	Cys	Met	Leu	Ile
			20					25					30		
Cys	Tyr	Thr	Cys	Asn	Lys	Phe	Pro	Thr	Asp	Tyr	Ile	Pro	Thr	Val	Phe
			35				40					45			
Asp	Asn	Phe	Ser	Ala	Asn	Val	Ser	Val	Asp	Gly	Ser	Ile	Val	Asn	Leu
	50					55				60					
Gly	Leu	Trp	Asp	Thr	Ala	Gly	Gln	Glu	Asp	Tyr	Ser	Arg	Leu	Arg	Pro
65					70				75					80	
Leu	Ser	Tyr	Arg	Gly	Ala	Asp	Val	Phe	Ile	Leu	Ser	Phe	Ser	Leu	Thr
				85					90					95	
Ser	Arg	Ala	Ser	Tyr	Glu	Asn	Val	His	Lys	Lys	Trp	Met	Pro	Glu	Leu
			100					105					110		
Arg	Arg	Tyr	Ala	Pro	Gly	Ile	Pro	Val	Leu	Leu	Val	Gly	Thr	Lys	Leu
			115				120					125			
Asp	Leu	Arg	Glu	Asp	Arg	Ala	Tyr	Leu	Ala	Asp	His	Ala	Ala	Asp	Ser
	130					135				140					
Ile	Ile	Thr	Thr	Glu	Gln	Gly	Glu	Asp	Leu	Arg	Arg	Gln	Ile	Gly	Ala
145					150				155					160	
Val	Ala	Tyr	Ile	Glu	Cys	Ser	Ser	Lys	Thr	Gln	Arg	Asn	Ile	Lys	Ala
				165					170					175	
Val	Phe	Asp	Thr	Ala	Ile	Lys	Ala	Val	Leu	Gln	Pro	Gln	Arg	His	Lys
			180					185					190		
Glu	Val	Ala	Arg	Lys	Glu	Thr	Arg	Thr	Arg	Ser	Ser	Arg	Ser	Val	Arg
		195					200					205			
Gln	Tyr	Phe	Cys	Gly	Ser	Ser	Cys	Phe	Ala						
	210					215									

<210> 385

<211> 721

<212> DNA

<213> Hordeum vulgare

<220>

<221> CDS

<222> (38)..(676)

<400> 385

gtggaggcgc	ggcgagagcg	gcggaggcgg	aggagag	atg	agc	gtg	acc	aag	ttc						
				Met	Ser	Val	Thr	Lys	Phe						
				1				5							
atc	aag	tgc	gtc	acg	gtg	ggg	gac	ggc	gcc	gtc	ggc	aag	acc	tgc	atg
Ile	Lys	Cys	Val	Thr	Val	Gly	Asp	Gly	Ala	Val	Gly	Lys	Thr	Cys	Met
			10					15					20		
ctc	atc	tgc	tac	acc	agc	aac	agg	ttc	ccc	agt	gat	tac	atc	ccc	acg
Leu	Ile	Cys	Tyr	Thr	Ser	Asn	Arg	Phe	Pro	Ser	Asp	Tyr	Ile	Pro	Thr
		25					30					35			
gtg	ttc	gac	aac	ttc	agc	gcc	aac	gtc	tcc	gtc	gac	ggc	aac	atc	gtc
Val	Phe	Asp	Asn	Phe	Ser	Ala	Asn	Val	Ser	Val	Asp	Gly	Asn	Ile	Val
		40				45					50				
aac	ctc	ggc	cta	tgg	gac	acc	gcc	ggg	caa	gaa	gac	tac	agc	cgg	ctg
Asn	Leu	Gly	Leu	Trp	Asp	Thr	Ala	Gly	Gln	Glu	Asp	Tyr	Ser	Arg	Leu
	55				60				65					70	

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agg ccg ctg agc tac aga ggc gcc gac gtg ttc gtg ctc gcc ttc tcc      295
Arg Pro Leu Ser Tyr Arg Gly Ala Asp Val Phe Val Leu Ala Phe Ser
      75      80      85
ctc atc agc agc gcc agc tac gag aat gtt ctt aag aag tgg atg cca      343
Leu Ile Ser Ser Ala Ser Tyr Glu Asn Val Leu Lys Lys Trp Met Pro
      90      95      100
gag ctc cgc cgg ttc gcg ccg aat gtc ccc att gtt ctt gtt ggg acc      391
Glu Leu Arg Arg Phe Ala Pro Asn Val Pro Ile Val Leu Val Gly Thr
      105      110      115
aag cta gat ctg cgt gac cac aga gcc tac ctc gcc gac cac ccc ggt      439
Lys Leu Asp Leu Arg Asp His Arg Ala Tyr Leu Ala Asp His Pro Gly
      120      125      130
gct tca gca atc aca act gca cag ggt gaa gaa ctt agg aag cag atc      487
Ala Ser Ala Ile Thr Thr Ala Gln Gly Glu Glu Leu Arg Lys Gln Ile
      135      140      145      150
ggc gcc gcg gct tac atc gag tgc agc tcc aag aca cag cag aac gtc      535
Gly Ala Ala Ala Tyr Ile Glu Cys Ser Ser Lys Thr Gln Gln Asn Val
      155      160      165
aag gct gtg ttt gac acc gcc ata aag gtg gtc ctc cag ccg ccg agg      583
Lys Ala Val Phe Asp Thr Ala Ile Lys Val Val Leu Gln Pro Pro Arg
      170      175      180
aga agg gag gtg atg tcc gcc agg aag aaa acc agg cga agc tct gga      631
Arg Arg Glu Val Met Ser Ala Arg Lys Lys Thr Arg Arg Ser Ser Gly
      185      190      195
tgc tcc atc aag cac ttg atc tgc ggg agt acg tgc gct gct tgaattagca      683
Cys Ser Ile Lys His Leu Ile Cys Gly Ser Thr Cys Ala Ala
      200      205      210
ccatggaggc ctggactgac tatggagatg aagcatgg      721

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<210> 386

<211> 212

<212> PRT

<213> Hordeum vulgare

<400> 386

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Met Ser Val Thr Lys Phe Ile Lys Cys Val Thr Val Gly Asp Gly Ala
1      5      10      15
Val Gly Lys Thr Cys Met Leu Ile Cys Tyr Thr Ser Asn Arg Phe Pro
      20      25      30
Ser Asp Tyr Ile Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val Ser
      35      40      45
Val Asp Gly Asn Ile Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln
      50      55      60
Glu Asp Tyr Ser Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp Val
      65      70      75      80
Phe Val Leu Ala Phe Ser Leu Ile Ser Ser Ala Ser Tyr Glu Asn Val
      85      90      95
Leu Lys Lys Trp Met Pro Glu Leu Arg Arg Phe Ala Pro Asn Val Pro
      100      105      110
Ile Val Leu Val Gly Thr Lys Leu Asp Leu Arg Asp His Arg Ala Tyr
      115      120      125
Leu Ala Asp His Pro Gly Ala Ser Ala Ile Thr Thr Ala Gln Gly Glu
      130      135      140
Glu Leu Arg Lys Gln Ile Gly Ala Ala Ala Tyr Ile Glu Cys Ser Ser
      145      150      155      160
Lys Thr Gln Gln Asn Val Lys Ala Val Phe Asp Thr Ala Ile Lys Val
      165      170      175
Val Leu Gln Pro Pro Arg Arg Arg Glu Val Met Ser Ala Arg Lys Lys
      180      185      190
Thr Arg Arg Ser Ser Gly Cys Ser Ile Lys His Leu Ile Cys Gly Ser
      195      200      205
Thr Cys Ala Ala
      210

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<210> 387

<211> 699
 <212> DNA
 <213> Hordeum vulgare

<220>
 <221> CDS
 <222> (67)..(660)

<400> 387
 ggatcccgat tccatcagga aagcatatag actagcccag taaatagaaa taagnaaaga 60

tcggcg atg agc gca tct cgg ttc atc aag tgc gtg acg gtg ggg gac 108
 Met Ser Ala Ser Arg Phe Ile Lys Cys Val Thr Val Gly Asp
 1 5 10

ggc gcc gtg gga aag aca tgc ctc ctc atc tca tac aca tcc aac acc 156
 Gly Ala Val Gly Lys Thr Cys Leu Leu Ile Ser Tyr Thr Ser Asn Thr
 15 20 25 30

ttc ccc aca gac tat gtc cca aca gtt ttc gac aac ttc agc gct aac 204
 Phe Pro Thr Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn
 35 40 45

gtc gtg gtt gac ggc agc acc gtc aac ctc gga tta tgg gat act gca 252
 Val Val Val Asp Gly Ser Thr Val Asn Leu Gly Leu Trp Asp Thr Ala
 50 55 60

gga caa gaa gac tat aat cga cta cgc cca cta agc tac cgt ggt gcc 300
 Gly Gln Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala
 65 70 75

gat gtc ttc ctg ctc gcc ttt tct ctc atc agc aaa gca agc tac gag 348
 Asp Val Phe Leu Leu Ala Phe Ser Leu Ile Ser Lys Ala Ser Tyr Glu
 80 85 90

aat gtc act aag aag tgg att cca gag tta cgg cac tat gct cct ggc 396
 Asn Val Thr Lys Lys Trp Ile Pro Glu Leu Arg His Tyr Ala Pro Gly
 95 100 105 110

gtg ccc ata att ctt gtt gga aca aag ctt gat ctg cgg gat gac aag 444
 Val Pro Ile Ile Leu Val Gly Thr Lys Leu Asp Leu Arg Asp Asp Lys
 115 120 125

cag ttt ttt gtg gat cac cct ggg gcg gtt cct att tcc act gct cag 492
 Gln Phe Phe Val Asp His Pro Gly Ala Val Pro Ile Ser Thr Ala Gln
 130 135 140

ggt gaa gag ctg aag aag gtg att ggc gcg act gcc tac atc gag tgc 540
 Gly Glu Glu Leu Lys Lys Val Ile Gly Ala Thr Ala Tyr Ile Glu Cys
 145 150 155

agc tca aaa aca cag cag aac atc aag gcg gtg ttt gat gcg gcg atc 588
 Ser Ser Lys Thr Gln Gln Asn Ile Lys Ala Val Phe Asp Ala Ala Ile
 160 165 170

aag gtg gtc ctc cag cct ccg aag cag aag cgg aag aag agg aag tca 636
 Lys Val Val Leu Gln Pro Pro Lys Gln Lys Lys Arg Lys Ser
 175 180 185 190

cag aaa gga tgc agc atc ttg taaagctaaa atcccttttg ttttgcagtg 687
 Gln Lys Gly Cys Ser Ile Leu
 195

tctcgcgctcg ac 699

<210> 388
 <211> 197
 <212> PRT
 <213> Hordeum vulgare

<400> 388
 Met Ser Ala Ser Arg Phe Ile Lys Cys Val Thr Val Gly Asp Gly Ala
 1 5 10 15
 Val Gly Lys Thr Cys Leu Leu Ile Ser Tyr Thr Ser Asn Thr Phe Pro
 20 25 30
 Thr Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val Val
 35 40 45

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Val Asp Gly Ser Thr Val Asn Leu Gly Leu Trp Asp Thr Ala Gly Gln
 50 55 60
 Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp Val
 65 70 75 80
 Phe Leu Leu Ala Phe Ser Leu Ile Ser Lys Ala Ser Tyr Glu Asn Val
 85 90 95
 Thr Lys Lys Trp Ile Pro Glu Leu Arg His Tyr Ala Pro Gly Val Pro
 100 105 110
 Ile Ile Leu Val Gly Thr Lys Leu Asp Leu Arg Asp Asp Lys Gln Phe
 115 120 125
 Phe Val Asp His Pro Gly Ala Val Pro Ile Ser Thr Ala Gln Gly Glu
 130 135 140
 Glu Leu Lys Lys Val Ile Gly Ala Thr Ala Tyr Ile Glu Cys Ser Ser
 145 150 155 160
 Lys Thr Gln Gln Asn Ile Lys Ala Val Phe Asp Ala Ala Ile Lys Val
 165 170 175
 Val Leu Gln Pro Pro Lys Gln Lys Arg Lys Lys Arg Lys Ser Gln Lys
 180 185 190
 Gly Cys Ser Ile Leu
 195

<210> 389

<211> 677

<212> DNA

<213> Hordeum vulgare

<220>

<221> CDS

<222> (27)..(668)

<400> 389

ggatccttct cgtccattta gccggc atg gcg tcc agc gcc tcc cgg ttc atc 53
 Met Ala Ser Ser Ala Ser Arg Phe Ile
 1 5
 aag tgc gtc acc gtc ggg gac ggc gcc gtc ggc aag acc tgc atg ctc 101
 Lys Cys Val Thr Val Gly Asp Gly Ala Val Gly Lys Thr Cys Met Leu
 10 15 20 25
 atc tgc tac acc agc aac aag ttc ccc acc gac tac gtg ccc acc gtg 149
 Ile Cys Tyr Thr Ser Asn Lys Phe Pro Thr Asp Tyr Val Pro Thr Val
 30 35 40
 ttc gac aat ttc agc gcg aac gtg gtg gtg gac ggc acc acc gtg aac 197
 Phe Asp Asn Phe Ser Ala Asn Val Val Val Asp Gly Thr Thr Val Asn
 45 50 55
 ctg ggc ctc tgg gac act gca ggg cag gag gac tac aac aga ttg aga 245
 Leu Gly Leu Trp Asp Thr Ala Gly Gln Glu Asp Tyr Asn Arg Leu Arg
 60 65 70
 ccg ctg agc tac cgg gga gcc gac gtc ttc gtg ctc tcc ttc tcc ctc 293
 Pro Leu Ser Tyr Arg Gly Ala Asp Val Phe Val Leu Ser Phe Ser Leu
 75 80 85
 gtc agc cga gcc agc tac gag aat gtc atg aag aag tgg cta ccg gag 341
 Val Ser Arg Ala Ser Tyr Glu Asn Val Met Lys Lys Trp Leu Pro Glu
 90 95 100 105
 ctt cag cac cat gca ccc ggc gtg cca aca gtg ctg gtt ggt aca aag 389
 Leu Gln His His Ala Pro Gly Val Pro Thr Val Leu Val Gly Thr Lys
 110 115 120
 cta gat cta cgt gaa gac aag caa tac tta ctt gac cac ccc ggc gtg 437
 Leu Asp Leu Arg Glu Asp Lys Gln Tyr Leu Leu Asp His Pro Gly Val
 125 130 135
 gtg cct gtt act aca gct cag ggg gag gaa ctc cgc aag cac atc ggt 485
 Val Pro Val Thr Thr Ala Gln Gly Glu Glu Leu Arg Lys His Ile Gly
 140 145 150
 gca act tgt tat gtc gaa tgc agc tca aag aca cag cag aat gtc aaa 533
 Ala Thr Cys Tyr Val Glu Cys Ser Ser Lys Thr Gln Gln Asn Val Lys
 155 160 165
 gct gtg ttt gat gct gcc atc aag gta gtg atc aaa cct cca aca aag 581
 Ala Val Phe Asp Ala Ala Ile Lys Val Val Ile Lys Pro Pro Thr Lys
 170 175 180 185
 cag agg gaa agg agg aag aag aaa gca cgg caa gga tgt gca tca ttg 629

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Gln Arg Glu Arg Arg Lys Lys Lys Ala Arg Gln Gly Cys Ala Ser Leu
 190 195 200
 ggt acc ctg tca aga agg aag ctg gca tgc ttc aag tgatcagtcg 675
 Gly Thr Leu Ser Arg Arg Lys Leu Ala Cys Phe Lys
 205 210
 ac 677

<210> 390
 <211> 213
 <212> PRT
 <213> Hordeum vulgare

<400> 390
 Met Ala Ser Ser Ala Ser Arg Phe Ile Lys Cys Val Thr Val Gly Asp
 1 5 10 15
 Gly Ala Val Gly Lys Thr Cys Met Leu Ile Cys Tyr Thr Ser Asn Lys
 20 25 30
 Phe Pro Thr Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn
 35 40 45
 Val Val Val Asp Gly Thr Thr Val Asn Leu Gly Leu Trp Asp Thr Ala
 50 55 60
 Gly Gln Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala
 65 70 75 80
 Asp Val Phe Val Leu Ser Phe Ser Leu Val Ser Arg Ala Ser Tyr Glu
 85 90 95
 Asn Val Met Lys Lys Trp Leu Pro Glu Leu Gln His His Ala Pro Gly
 100 105 110
 Val Pro Thr Val Leu Val Gly Thr Lys Leu Asp Leu Arg Glu Asp Lys
 115 120 125
 Gln Tyr Leu Leu Asp His Pro Gly Val Val Pro Val Thr Thr Ala Gln
 130 135 140
 Gly Glu Glu Leu Arg Lys His Ile Gly Ala Thr Cys Tyr Val Glu Cys
 145 150 155 160
 Ser Ser Lys Thr Gln Asn Val Lys Ala Val Phe Asp Ala Ala Ile
 165 170 175
 Lys Val Val Ile Lys Pro Pro Thr Lys Gln Arg Glu Arg Arg Lys Lys
 180 185 190
 Lys Ala Arg Gln Gly Cys Ala Ser Leu Gly Thr Leu Ser Arg Arg Lys
 195 200 205
 Leu Ala Cys Phe Lys
 210

<210> 391
 <211> 565
 <212> DNA
 <213> Nicotiana tabacum

<220>
 <221> CDS
 <222> (71)..(565)

<400> 391
 cttttttccaa tttcaactcc ataaaactaa gaagctagtg ttcttctttc ttatctttct 60

aattgatgag atg aat act agt agt agt gcc agt aat agt gct tct act 109
 Met Asn Thr Ser Ser Ser Ala Ser Asn Ser Ala Ser Thr
 1 5 10
 gca aca gga aca aag ttc atc aaa tgt gtg aca gtt gga gat ggt gct 157
 Ala Thr Gly Thr Lys Phe Ile Lys Cys Val Thr Val Gly Asp Gly Ala
 15 20 25
 gtt ggc aag act tgc ctt ctc atc tcc tac act agc tgc ctt ctc atc 205
 Val Gly Lys Thr Cys Leu Leu Ile Ser Tyr Thr Ser Cys Leu Leu Ile
 30 35 40 45
 tcc tac act agc aac act ttt cca act gat tat gtg cca act gtt ttt 253

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Ser	Tyr	Thr	Ser	Asn	Thr	Phe	Pro	Thr	Asp	Tyr	Val	Pro	Thr	Val	Phe		
				50					55					60			
gac	aat	ttc	agt	gct	aat	gtc	aat	gtt	gat	ggg	aag	att	gtg	aat	ttg		301
Asp	Asn	Phe	Ser	Ala	Asn	Val	Asn	Val	Asp	Gly	Lys	Ile	Val	Asn	Leu		
			65					70					75				
ggt	ctt	tgg	gat	act	gct	ggt	caa	gag	gat	tat	aac	agg	ctt	agg	cct		349
Gly	Leu	Trp	Asp	Thr	Ala	Gly	Gln	Glu	Asp	Tyr	Asn	Arg	Leu	Arg	Pro		
			80				85					90					
ctt	agt	tat	cga	gga	gct	gac	gtc	ttc	ttg	ctt	gca	ttc	tct	ctc	ata		397
Leu	Ser	Tyr	Arg	Gly	Ala	Asp	Val	Phe	Leu	Leu	Ala	Phe	Ser	Leu	Ile		
			95				100					105					
agt	agg	cct	agc	ttt	gaa	aat	ata	tca	aaa	aag	tgg	gtt	cct	gag	cta		445
Ser	Arg	Pro	Ser	Phe	Glu	Asn	Ile	Ser	Lys	Lys	Trp	Val	Pro	Glu	Leu		
						115				120					125		
aga	cat	tat	gcc	cca	tca	gtg	cct	att	gtt	ctt	gtg	ggg	act	aaa	ttg		493
Arg	His	Tyr	Ala	Pro	Ser	Val	Pro	Ile	Val	Leu	Val	Gly	Thr	Lys	Leu		
				130					135					140			
gat	tta	aga	gag	gac	aag	cag	ttt	aga	agg	gac	tac	cct	ggt	gca	tct		541
Asp	Leu	Arg	Glu	Asp	Lys	Gln	Phe	Arg	Arg	Asp	Tyr	Pro	Gly	Ala	Ser		
				145				150					155				
aca	att	tca	aca	gaa	cag	ggc	tag										565
Thr	Ile	Ser	Thr	Glu	Gln	Gly											
				160													

<210> 392

<211> 164

<212> PRT

<213> Nicotiana tabacum

<400> 392

Met	Asn	Thr	Ser	Ser	Ala	Ser	Asn	Ser	Ala	Ser	Thr	Ala	Thr	Gly			
1			5				10					15					
Thr	Lys	Phe	Ile	Lys	Cys	Val	Thr	Val	Gly	Asp	Gly	Ala	Val	Gly	Lys		
			20				25					30					
Thr	Cys	Leu	Leu	Ile	Ser	Tyr	Thr	Ser	Cys	Leu	Leu	Ile	Ser	Tyr	Thr		
			35				40					45					
Ser	Asn	Thr	Phe	Pro	Thr	Asp	Tyr	Val	Pro	Thr	Val	Phe	Asp	Asn	Phe		
			50			55					60						
Ser	Ala	Asn	Val	Asn	Val	Asp	Gly	Lys	Ile	Val	Asn	Leu	Gly	Leu	Trp		
			65			70				75				80			
Asp	Thr	Ala	Gly	Gln	Glu	Asp	Tyr	Asn	Arg	Leu	Arg	Pro	Leu	Ser	Tyr		
			85					90					95				
Arg	Gly	Ala	Asp	Val	Phe	Leu	Leu	Ala	Phe	Ser	Leu	Ile	Ser	Arg	Pro		
			100					105					110				
Ser	Phe	Glu	Asn	Ile	Ser	Lys	Lys	Trp	Val	Pro	Glu	Leu	Arg	His	Tyr		
			115				120					125					
Ala	Pro	Ser	Val	Pro	Ile	Val	Leu	Val	Gly	Thr	Lys	Leu	Asp	Leu	Arg		
			130			135					140						
Glu	Asp	Lys	Gln	Phe	Arg	Arg	Asp	Tyr	Pro	Gly	Ala	Ser	Thr	Ile	Ser		
			145		150					155					160		
Thr	Glu	Gln	Gly														

<210> 393

<211> 1057

<212> DNA

<213> Nicotiana tabacum

<220>

<221> CDS

<222> (176)..(808)

<400> 393

ggcaccgagaa gctattaatt ccaagctatc tccacaccct ctccccaac aagaaaatta 60

ttaaatgtaa aacgtactac tagaccccca gttacatata taaacacaca tcattctgcag 120

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aattttggta tgcaatttta cgtactttct tgaggtattt ttttttttat gttca atg      178
                                     Met
                                     1
gcc tca agt gct tca aga ttc atc aaa tgt gtc acg gtt ggt gat ggt      226
Ala Ser Ser Ala Ser Arg Phe Ile Lys Cys Val Thr Val Gly Asp Gly
                    5                10                15
gcc gtt gga aag act tgt atg ctt att tgc tat acc agt aac aag ttc      274
Ala Val Gly Lys Thr Cys Met Leu Ile Cys Tyr Thr Ser Asn Lys Phe
                    20                25                30
ccc act gat tat gtt ccc aca gtg ttt gac aac ttc agt gcc aat gtg      322
Pro Thr Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn Val
                    35                40                45
gtt gtc gaa ggg acc aca gta aat tta ggt ctt tgg gat act gca ggc      370
Val Val Glu Gly Thr Thr Val Asn Leu Gly Leu Trp Asp Thr Ala Gly
                    50                55                60                65
caa gaa gat tat aaC aga tta agg cca ctg agc tac cga gga gca gat      418
Gln Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala Asp
                    70                75                80
gtt ttt gtc cta gcg ttc tcc ttg gtt agt cgc gca agc tac gag aac      466
Val Phe Val Leu Ala Phe Ser Leu Val Ser Arg Ala Ser Tyr Glu Asn
                    85                90                95
ata ctt aaa aag tgg att cct gaa ctt cag cat tat gct cct gga ata      514
Ile Leu Lys Lys Trp Ile Pro Glu Leu Gln His Tyr Ala Pro Gly Ile
                    100                105                110
ccg gtg gta tta gct ggc acc aaa ctt gat ctt cgt gag gat aag cac      562
Pro Val Val Leu Ala Gly Thr Lys Leu Asp Leu Arg Glu Asp Lys His
                    115                120                125
ttc ttg gct gat cat cct gga tta gtt cct gtc acc acc gcg cag gga      610
Phe Leu Ala Asp His Pro Gly Leu Val Pro Val Thr Thr Ala Gln Gly
                    130                135                140                145
gag gag cta cgg aaa caa att ggt gct gcc tat tac atc gaa tgt agc      658
Glu Glu Leu Arg Lys Gln Ile Gly Ala Ala Tyr Tyr Ile Glu Cys Ser
                    150                155                160
tct aaa aca caa cag aat gtg aaa gct gtc ttt gat gct gca atc aag      706
Ser Lys Thr Gln Gln Asn Val Lys Ala Val Phe Asp Ala Ala Ile Lys
                    165                170                175
gtc gtc atc aag cca ccg cag aag caa aag gag aag aag aaa caa cgt      754
Val Val Ile Lys Pro Pro Gln Lys Gln Lys Glu Lys Lys Lys Gln Arg
                    180                185                190
cga gga tgt ctc atg aat gtg atg tgc gga agg aag ctc gtt tgt ttg      802
Arg Gly Cys Leu Met Asn Val Met Cys Gly Arg Lys Leu Val Cys Leu
                    195                200                205
aag tgacatttca atgtacatat ttcccatctg ttcggcctct aacatgattt      855
Lys
210
atatccatgg ctttagcgtg ctgcctataa aacttacatt tctatcagaa cttttgtgac      915

gagcataatg tatttgtttt tccataaccc aacttactgc tggacggcct tgatttgtct      975

gtaaaatacg ttacttgcta ggtttatatt tcaagtacat gtattaattc tattaaacca      1035

acaaaaaaaaa aaaaaaaaaa aa      1057

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<210> 394

<211> 210

<212> PRT

<213> Nicotiana tabacum

<400> 394

Met Ala Ser Ser Ala Ser Arg Phe Ile Lys Cys Val Thr Val Gly Asp

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1 5 10 15
 Gly Ala Val Gly Lys Thr Cys Met Leu Ile Cys Tyr Thr Ser Asn Lys
 20 25 30
 Phe Pro Thr Asp Tyr Val Pro Thr Val Phe Asp Asn Phe Ser Ala Asn
 35 40 45
 Val Val Val Glu Gly Thr Thr Val Asn Leu Gly Leu Trp Asp Thr Ala
 50 55 60
 Gly Gln Glu Asp Tyr Asn Arg Leu Arg Pro Leu Ser Tyr Arg Gly Ala
 65 70 75 80
 Asp Val Phe Val Leu Ala Phe Ser Leu Val Ser Arg Ala Ser Tyr Glu
 85 90 95
 Asn Ile Leu Lys Lys Trp Ile Pro Glu Leu Gln His Tyr Ala Pro Gly
 100 105 110
 Ile Pro Val Val Leu Ala Gly Thr Lys Leu Asp Leu Arg Glu Asp Lys
 115 120 125
 His Phe Leu Ala Asp His Pro Gly Leu Val Pro Val Thr Thr Ala Gln
 130 135 140
 Gly Glu Glu Leu Arg Lys Gln Ile Gly Ala Ala Tyr Tyr Ile Glu Cys
 145 150 155 160
 Ser Ser Lys Thr Gln Gln Asn Val Lys Ala Val Phe Asp Ala Ala Ile
 165 170 175
 Lys Val Val Ile Lys Pro Pro Gln Lys Gln Lys Glu Lys Lys Lys Gln
 180 185 190
 Arg Arg Gly Cys Leu Met Asn Val Met Cys Gly Arg Lys Leu Val Cys
 195 200 205
 Leu Lys
 210.

<210> 395
 <211> 24
 <212> DNA
 <213> Primer

<400> 395
 atgtctgaaa aggccgtagg aagg

24

<210> 396
 <211> 26
 <212> DNA
 <213> Primer

<400> 396
 ttataaaatt atgcaacagt tagccc

26

<210> 397
 <211> 20
 <212> PRT
 <213> consensus

<220>

<221> MISC_FEATURE

<222> (1)..(20)

<223> Xaa in postion 2 is any amino acid, Xaa in postion 4 is Val, Thr, Ile or Leu, Xaa in position 5 is Val, Ile or Leu, Xaa in position 9 is Ala or Gly, Xaa in position 10 is any amino acid, Xaa in position 14 is Cys, Ser or Ala, Xaa in position 15 is Leu or Met, Xaa in position 16 is Leu or Met, Xaa in position 17 is any amino acid, Xaa in position 18 is any amino acid, Xaa in position 19 is Tyr or Phe, Xaa in position 20 is Thr, Ser or Ala.

<400> 397

Lys Xaa Val Xaa Xaa Gly Asp Gly Xaa Xaa Gly Lys Thr Xaa Xaa Xaa
1 5 10 15

Xaa Xaa Xaa Xaa
20

<210> 398

<211> 13

<212> PRT

<213> consensus

<220>

<221> MISC_FEATURE

<222> (1)..(13)

<223> Xaa in position 1 is Phe or Tyr, Xaa in position 3 is any amino acid, Xaa in position 4 is any amino acid, Xaa in position 6 is Val, Ile or Glu, Xaa in position 9 is Val or Ile, Xaa in position 11 is Asp or Glu, Xaa in position 12 is any amino acid, Xaa in position 13 is Tyr or Phe.

<400> 398

Xaa Pro Xaa Xaa Tyr Xaa Pro Thr Xaa Phe Xaa Xaa Xaa
1 5 10

<210> 399

<211> 22

<212> PRT

<213> consensus

<220>

<221> MISC_FEATURE

<222> (1)..(22)

<223> Xaa in position 1 is Val, Ile or Tyr, Xaa in position 2 is any amino acid, Xaa in position 3 is Leu, Val or Ile, Xaa in position 4 is any amino acid, Xaa in position 5 is Leu, Ile or Met, Xaa in position 6 is Trp or Phe, Xaa in position 9 is Ala or Ser, Xaa in position 12 is Glu or Asp, Xaa in position 13 is Asp or Glu, Xaa in position 14 is Tyr or Phe, Xaa in position 15 is any amino acid, Xaa in position 16 is Arg, Lys or Asn, Xaa in position 17 is Leu, Ile or Val, Xaa in position 19 is Pro, Ser or Thr, Xaa in position 20 is Leu or Met, Xaa in position 21 is Ser, Ala or Phe.

<400> 399

Xaa Xaa Xaa Xaa Xaa Xaa Asp Thr Xaa Gly Gln Xaa Xaa Xaa Xaa Xaa
1 5 10 15

Xaa Arg Xaa Xaa Xaa Tyr
20

<210> 400

<211> 143

<212> PRT

<213> consensus

<220>

<221> MISC_FEATURE

<222> (1)..(143)

<223> Xaa in all postions is any amino acid.

<400> 400

Lys Xaa Val Xaa Val Gly Asp Gly Ala Xaa Gly Lys Thr Cys Leu Leu
1 5 10 15

Ile Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Phe
20 25 25

Pro Xaa Xaa Tyr Xaa Pro Thr Val Phe Xaa Asn Xaa Xaa Xaa Xaa Xaa
30 35 40

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Leu Xaa Leu Trp Asp Thr
45 50 55

Ala Gly Gln Glu Asp Tyr Xaa Arg Leu Arg Pro Leu Ser Tyr Xaa Xaa
60 65 70 75

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
80 85 90

Xaa Xaa Xaa Xaa Asp Val Xaa Xaa Xaa Xaa Phe Ser Xaa Xaa Xaa Xaa
95 100 105

Xaa Ser Xaa Xaa Asn Xaa Xaa Xaa Lys Trp Xaa Pro Glu Xaa Xaa Xaa
110 115 120

Xaa Xaa Xaa Pro Xaa Xaa Pro Xaa Xaa Leu Val Gly Xaa Lys Xaa Asp
125 130 135

Leu Arg Xaa Asp
140

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14 July 2005

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: PROCESS FOR THE PRODUCTION OF FINE CHEMICALS IN PLANTS

(57) Abstract: The present invention relates to a process for the production of the fine chemical in a microorganism, a plant cell, a plant, a plant tissue or in one or more parts thereof. The invention furthermore relates to nucleic acid molecules, polypeptides, nucleic acid constructs, vectors, antisense molecules, antibodies, host cells, plant tissue, propagation material, harvested material, plants, microorganisms as well as agricultural compositions and their use.

WO 2005/014828 A3

INTERNATIONAL SEARCH REPORT

International Application No

PCT/EP2004/008136

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 C12N15/82 C07K14/395 C12N5/10 G01N33/50 C07K16/14
A01H5/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 C12N C07K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, Sequence Search, WPI Data, PAJ, BIOSIS, EMBASE, CHEM ABS Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	MADAULE P ET AL: "CHARACTERIZATION OF TWO MEMBERS OF THE RHO GENE FAMILY FROM THE YEAST SACCHAROMYCES CEREVISIAE" PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF USA, NATIONAL ACADEMY OF SCIENCE. WASHINGTON, US, vol. 84, February 1987 (1987-02), pages 779-783, XP002038042 ISSN: 0027-8424 the whole document -/--	1-26

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

28 January 2005

Date of mailing of the international search report

29. 04. 05

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INTERNATIONAL SEARCH REPORT

International Application No
PCT/EP2004/008136

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	-& DATABASE EMBL [Online] Yeast (S.cerevisiae) ras-related RH02 gene 19 September 1987 (1987-09-19), MADAULE ET AL.: "Characterization of two members of the rho gene family from the yeast Saccharomyces cerevisiae" XP002313427 retrieved from EBI Database accession no. M15190 abstract	1-26
A	----- WO 01/59128 A (ZAEHRINGER ULRICH ; BASF AG (DE); HEINZ ERNST (DE); LERCHL JENS (DE);) 16 August 2001 (2001-08-16) the whole document	1-26
A	----- WO 01/44276 A (BASF PLANT SCIENCE GMBH ; LERCHL JENS (DE); BADUR RALF (DE); CIRPUS PE) 21 June 2001 (2001-06-21) the whole document	1-26
A	----- WO 01/00804 A (BASF AG) 4 January 2001 (2001-01-04) the whole document	1-26
A	----- WO 03/040293 A (HABERHAUER GREGOR ; SCHROEDER HARTWIG (DE); BASF AG (DE); POMPEJUS MAR) 15 May 2003 (2003-05-15) the whole document -----	1-26

INTERNATIONAL SEARCH REPORT

International application No.
PCT/EP2004/008136

Box II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☒ Claims Nos.: 25 (partially)
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
see FURTHER INFORMATION sheet PCT/ISA/210
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:
1-26 (all partially)

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box II.2

Claims Nos.: 25 (partially)

Present claim 25 relates to a composition comprising a product defined by reference to a desirable characteristic or property, namely to act as an agonist or antagonist of the protein as defined by SEQ ID NO:2. The application does not provide support within the meaning of Article 6 PCT nor disclosure within the meaning of Article 5 PCT for such a product. In the present case, the claim so lacks support, and the application so lacks disclosure, that a meaningful search is impossible.

Independent of the above reasoning, the claim also lacks clarity (Article 6 PCT). An attempt is made to define a product within a process by reference to a result to be achieved. Again, this lack of clarity in the present case is such as to render a meaningful search impossible. The search has therefore been limited to those parts of the claim that appear to disclosed and supported, namely those parts relating to all other products comprised in the composition of claim 25 except the agonists and antagonists.

The applicant's attention is drawn to the fact that claims relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure. If the application proceeds into the regional phase before the EPO, the applicant is reminded that a search may be carried out during examination before the EPO (see EPO Guideline C-VI, 8.5), should the problems which led to the Article 17(2) declaration be overcome.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

Invention 1: Claims 1-26 (all partially)

relating to an isolated nucleic acid sequence (SEQ ID NO:1), the corresponding amino acid sequence (SEQ ID NO:2) and methods and products comprising said sequences.

Inventions 2-193: Claims 1-26 (all partially)

as invention 1 but relating to the isolated nucleic acid sequences with SEQ ID NOs:3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, 43, 45, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83, 85, 87, 89, 91, 93, 95, 97, 99, 101, 103, 105, 107, 109, 111, 113, 115, 117, 119, 121, 123, 125, 127, 129, 131, 133, 135, 137, 139, 141, 143, 145, 147, 149, 151, 153, 155, 157, 159, 161, 163, 165, 167, 169, 171, 173, 175, 177, 179, 181, 183, 185, 187, 189, 191, 193, 195, 197, 199, 201, 203, 205, 207, 209, 211, 213, 215, 217, 219, 221, 223, 225, 227, 229, 231, 233, 235, 237, 239, 241, 243, 245, 247, 249, 251, 253, 255, 257, 259, 261, 263, 265, 267, 269, 271, 273, 275, 277, 279, 281, 283, 285, 287, 289, 291, 293, 295, 297, 299, 301, 303, 305, 307, 309, 311, 313, 315, 317, 319, 321, 323, 325, 327, 329, 331, 333, 335, 337, 339, 341, 343, 345, 347, 349, 351, 353, 355, 357, 359, 361, 363, 365, 367, 369, 371, 373, 375, 377, 379, 381, 383, 385, 387, 389, 391, 393 and the corresponding amino acid sequences with SEQ ID NOs:4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 220, 222, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392, 394.

Inventions 194: Claims 1-26 (all partially)

relating to an amino acid sequence comprising the sequence motif as displayed in SEQ ID NO:47, nucleic acid sequence encoding said amino acid and methods and products comprising said sequences.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Inventions 195-203: Claims 1-26 (all partially)

as invention 1 but relating to amino acid sequences
comprising the sequence motifs as displayed in SEQ ID
NOs:48, 49, 50, 51, 52, 397, 398, 399, 400.

Invention 204: Claims 2-26 (all partially)

relating to nucleic acid molecules amplified from a library
using the primers in SEQ ID NO:53 and methods and products
comprising said sequence.

Invention 205: Claims 2-26 (all partially)

relating to nucleic acid molecules amplified from a library
using the primers in SEQ ID NO:54 and methods and products
comprising said sequence.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/EP2004/008136

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International Application No

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